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RANGE SHEEP PRODUCTION IN WESTERN CANADA

by

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A GOOD COMMERCIAL BAND OF EWES AND THEIR LAMBS

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RANGE SHEEP PRODUCTION IN WESTERN CANADA

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INTRODUCTION

The range sheep industry in Western Canada had its beginning in the early 1880's when range sheep, mainly of Merino breeding, were brought to Canada from the range areas of the United States. At that time range sheep management was essentially the same as that practised in the United States, but conditions have changed. The question arises whether management and feeding practices have kept pace with the new conditions.

The purpose of this bulletin is to review for present and prospective range sheep producers what is known of the best practices in use by producers both in Canada and other parts of the world. An attempt is made to suggest how the latest knowledge of breeding, feeding, range conservation, and general management practices may be used to improve range sheep production and thus lead to increased profits. Specific recommendations, based on available evidence, are made wherever possible, but in many cases the best that can be done is to discuss the advantages and disadvantages of various methods that have been or may be used. In this way it is hoped to bring to the attention of producers new ideas that they may be able to use. The bulletin deals with practices applicable to the range areas of Alberta and Saskatchewan though many of the general principles and suggestions may be useful to producers in other areas.

Status of the Range Sheep Industry

Whenever man has found large tracts of open land with good grass he has introduced sheep to utilize this grass, and this was the basis on which the range sheep industry of Western Canada developed. In Alberta and Saskatchewan favourable climate and good grass continue to be available to range sheep producers. There always has been competition between sheepmen and cattlemen for available grass, and in the earlier years of this century both were in competition with grain producers. However, the lines between grain producing areas and grass producing areas are becoming reasonably well defined, except as they may be changed by such man-made factors as major irrigation developments.

The competition between sheep and cattle for available grass likely will continue. Since World War II the noticeable decline in the range sheep population has been partly offset by an increase in the number of cattle. Until recent years, Alberta and Saskatchewan had substantial increases in numbers of sheep but the figures do not distinguish between range and farm sheep. In recent years slightly more than 60 per cent of the sheep in Alberta have been in the range areas, whereas in Saskatchewan the sheep in range and farm flocks have been nearly equal.

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Over the years range sheep production has yielded satisfactory financial returns although there have been good and bad years as in any other phase of production. The present market prospects for sheep products are favourable. The demand for wool is strong, especially for the type of wool produced by good range sheep. Canadian production is only a small percentage of that required by Canadian consumers. Though the per capita consumption of sheep meat is relatively low in comparison with beef and pork, Canada does not produce sufficient for her own use. Potentially there is a market for an increased volume of all sheep products.

From the production standpoint several favourable factors may be mentioned. Improved range sheep are being developed to suit Canadian conditions. Newer knowledge of nutrition can assist sheep ranchers in decreasing their unit cost of production and some developments in management are taking place to reduce the drudgery and labour of certain operations.

A summary of the range sheep industry in relation to total sheep production in Canada is given in table 1.

TABLE 1.—NUMBERS OF SHEEP IN CANADA* (in 1,000's)

Year	Canada	East	West	Alta.	Sask.	Range Sheep in Alta. and Sask. as per cent of total
1871.....	3,156	3,156				
1881.....	3,049	3,015	34			
1891.....	2,564	2,413	150	26	39	2
1901.....	2,510	2,294	216	87	66	5
1911.....	2,174	1,850	324	134	114	6
1921.....	3,200	2,400	800	432	195	11
1931.....	3,627	2,197	1,430	786	281	17
1941.....	2,840	1,463	1,377	675	330	18
1942.....	3,197	1,523	1,674	828	410	22
1943.....	3,459	1,637	1,822	900	463	22
1944.....	3,726	1,705	2,021	1,023	531	24
1945.....	3,622	1,707	1,915	975	513	23
1946.....	2,942	1,610	1,332	667	335	19
1947.....	2,707	1,422	1,185	614	285	18
1948.....	2,247	1,299	948	449	253	18
1949.....	2,075	1,175	900	442	234	18
1950.....	2,015	1,151	864	414	237	18
1951.....	1,968	1,100	868	417	236	18

*Figures taken from the Canada Yearbook.

Although there have been fluctuations in the number of sheep the total population showed no major change in trend until the end of World War II. Since 1931 about 20 per cent of the Canadian sheep population has been in the range flocks of Alberta and Saskatchewan, indicating that range sheep production is of considerable importance in the Canadian livestock economy.

The trend since 1946 has been steadily downward, with fewer sheep in Canada in 1951 than in any year since 1871. Many reasons have been given for the decline in the number of sheep, chief of which possibly are the losses caused by predatory animals, the lack of experienced labour, and the extra labour required at lambing and shearing time. Evidently sheep production lacks appeal to the younger generation. Whether this trend will continue may well depend on whether the sheep industry can be improved so that younger men will be attracted to the industry and give it new life.

PRINCIPLES OF RANGE SHEEP BREEDING

The basic principles of animal breeding are the same for the commercial producer as for the specialized breeder of purebred stock but the practical application of these principles is very different. Therefore, this bulletin deals only with those phases of the subject of most direct interest to the range men.

From a breeding standpoint the individual, rather than the flock, is of primary importance. Each breeding sheep must be considered as a parent, with the sire and the dam equally important in determining what the inherited characteristics of the offspring will be. The dam may be more important in determining the final development of the offspring, as she provides the environment in which the lamb develops until birth, and also influences directly the early development of the lamb because she supplies all its nourishment during the first stages of growth.

Since a sire has many offspring whereas a dam usually has only one or two in any one year, producers tend to feel that the sire is more important than any single dam. In some cases this has led to the idea that carelessness in selecting ewes would not be serious so long as sires were selected carefully. This is incorrect.

Selection, that is control by the breeder of the animals that are to become the parents of the next generation, is the most powerful tool that the commercial breeder has for improving his flock. One of the basic general principles of inheritance is that "like begets like", and if this is followed consistently it can be the basis for real flock improvement. If the parents have the desired characteristics the chances are that the progeny also will have these characteristics. In practice this principle may appear to fail at times, but that is because an animal's appearance is not always a complete picture of its inherent capacity.

Unfortunately several factors limit the amount of selection that can be practised and also the effectiveness of selection. A definite number of replacement animals must be kept if the flock is to be maintained at a constant number, and more must be saved if the flock is being expanded. In practice this means that the breeder may be forced to keep some animals that are not so good in all respects as he would like. This cannot be overcome entirely but, by improvement in management and disease control, it may be possible to produce a greater number of offspring and thus permit the saving of a smaller proportion of the total number. Since fewer males than females are required it is possible to practise stricter selection of the males than of the females, so in a sense the males can have a greater effect on improvement.

A second important factor limiting selection is the accuracy and care with which selection is made. The first disturbing feature is the effect of environment. It is generally agreed that for most important characteristics, environment and the genetic makeup of an individual interact to produce the end product. Thus two animals may be identical in their inheritance and yet be very different in appearance, especially in size and conformation. If one has been on a low plane of nutrition since birth and the other has been well fed throughout its life, they will differ in appearance. The breeder may make mistakes and discard some animals of superior genetic quality that did not develop properly because of undesirable environmental factors.

Accuracy of selection is influenced also by the standards of measurement used. The breeder must know definitely what he wants in his flock. If he lacks a clear picture of the characteristics that he desires, or if his ideal changes from year to year, it may happen that some animals will be discarded during one year and in the next similar animals will be saved. If this occurs selection loses its effectiveness.

Selection also is made difficult because several characteristics must be considered. For example, a sheep breeder is interested in size, conformation, vigour, face cover, wrinkling, staple length, fleece quality, and fleece density. Obviously stricter selection can be practised on one characteristic than on several. If a breeder had a flock of sheep perfect in all respects except that some had too much face cover then he could select for this one characteristic alone. If from 100 ewe lambs he had to save 50, he could simply save the 50 most nearly ideal for face cover and know that the flock would be as good as ever in other respects. However, in practice some of the 50 lambs selected on the basis of face cover alone would be so undesirable in other respects that they would have to be discarded. Therefore some animals not completely desirable for face cover would have to be saved in order to get animals desirable in other respects. Thus when numerous characteristics are involved selection for any one is reduced in intensity. Nevertheless, careful selection on the basis of total score or high average merit is more effective than selecting for one characteristic at a time.

CHOICE OF BREED OR BREED TYPE

The breed or breed type chosen must be one that is well adapted to the climatic and other conditions under which it is to be maintained. It should produce both wool and lamb that is highly acceptable from the standpoint of present day market requirements. As yet there is no breed that wholly meets these requirements for range sheep production, and considerable emphasis is being placed on the development of new types of sheep that combine the desirable features of two or more breeds.

The type of sheep best suited to western range conditions is one with a compact or "tight" fleece that protects the animal well in severe weather. This type of fleece usually grades one-half blood or finer and under normal grazing conditions is of satisfactory length. Sheep with open fleeces are very undesirable because they cannot withstand the rigors of range conditions. The sheep should be hardy; be able to "rustle"; have sufficient flocking instinct to herd easily; be of good size; have clean, white faces; and be free from wrinkles. Because lamb production represents a relatively large percentage of the returns from the sheep enterprise, good mutton conformation also is important.

BREEDS OF SHEEP

Rambouillet

The Rambouillet, developed in France and Germany from the Spanish Merino, has been the dominant breed type among range sheep in Western Canada. It has declined somewhat in importance in recent years because new crossbred types have been developed.

Rambouillets are very hardy sheep that possess good flocking or herding ability and are able to travel long distances and "rustle" a living under severe climatic conditions. They produce heavy fleeces of fine wool. The ewes are good milkers if well fed, but are not as good mothers under range conditions as some other breeds. Rambouillets have been criticized for their lack of good mutton conformation, their heavy wrinkling or neck folds, their short-stapled, greasy fleeces, and for too much wool cover on the face. Excessive wool cover on the face is objectionable because the ewes become "wool-blind." Consequently they do not graze so well and their production of lamb and wool is lowered.

During recent years the Experimental Stations at Lethbridge, Alta., and Swift Current, Sask., and the University of Saskatchewan, Saskatoon, have directed much effort toward the improvement of the Rambouillet breed. Mutton

conformation has been improved, wrinkling reduced, faces have become more open, and staple length has been increased. In addition the polled characteristic has been developed. Although much still remains to be done in the improvement of this breed it undoubtedly will remain as the foundation breed for sheep maintained on the open range.



Courtesy U.S. Sheep Experiment Station, Dubois, Idaho.

Figure 1—The Rambouillet is the basis for all range sheep production. This ram represents the desired type of range sheep. Note the open face and lack of neck folds.



Figure 2—A group of Rambouillet ewes at the Experimental Station, Lethbridge. Note that many of these ewes have open faces and are relatively free from neckfolds.



Figure 3—The Canadian Corriedale has been developed at the Experimental Station, Lethbridge, for western range conditions.



Figure 4—These shearling Romnelets show the body conformation and wool covering typical of this breed type.

Corriedale

The Corriedale breed of sheep originated in New Zealand from crosses between Merino ewes and Lincoln and Leicester rams. It is a popular breed in certain areas of New Zealand and is gaining popularity in other countries. In Canada the Canadian Corriedale has been developed at the Experimental Station, Lethbridge, by crossing New Zealand Corriedale rams and Rambouillet

× Lincoln ewes. The original cross was made in 1919. The Canadian Corriedales, which resemble the New Zealand Corriedales in many respects, are prolific, free from wrinkles, fairly open faced, produce a desirable type of market lamb, and possess the flocking characteristic of the Rambouillet. They produce a good fleece of half-blood wool. Under range conditions they are not so hardy as the Rambouillet and are somewhat smaller. They are well suited to range and farm production and for crossing on range ewes carrying a considerable amount of Rambouillet blood.

Romnelet

The Romnelet is the result of a Romney Marsh × Rambouillet cross made in 1935 at the Range Experiment Station, Manyberries, Alta., to test the promising results of a similar cross made by R. C. Harvey, Lethbridge, Alta., in the 1920's. The Romnelets have many desirable characteristics as range sheep for Western Canada. They have good mutton conformation and a good covering of wool grading one-half to three-eighths blood. They herd easily, the ewes are heavy milkers, prolific, and the lambs are growthy. They are similar to the Canadian Corriedale in hardiness, herding ability, and face cover. To date this has been a very promising breed, particularly under relatively good range feed conditions.

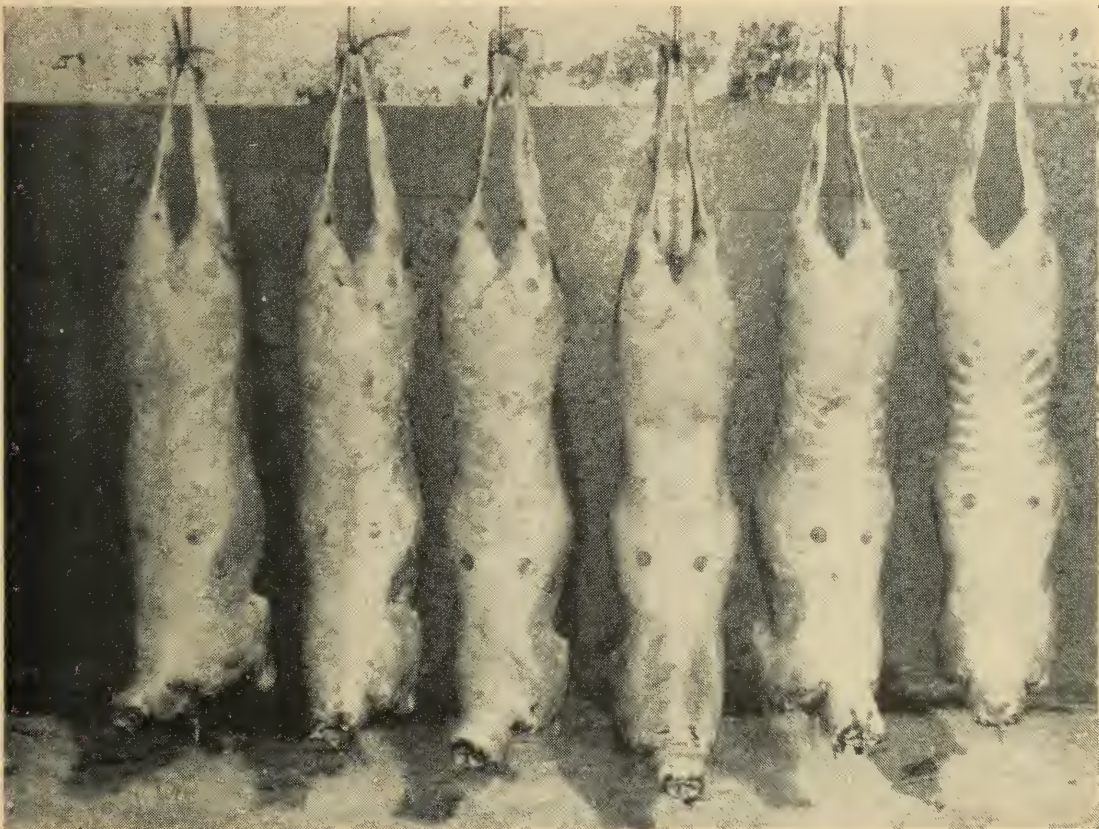


Figure 5—Although herding “instinct”, hardiness, and foraging ability are desirable characteristics of a good range sheep, it also is desirable that they produce a lamb of good mutton conformation. Shown above are two representative carcasses from the Canadian Corriedale (left), Rambouillet (centre), and Romnelet (right), raised and fed at the Experimental Station, Lethbridge. Note the desirable mutton conformation of the Canadian Corriedale and Romnelet. The Rambouillet is somewhat leggy and lacks width.

Romeldale

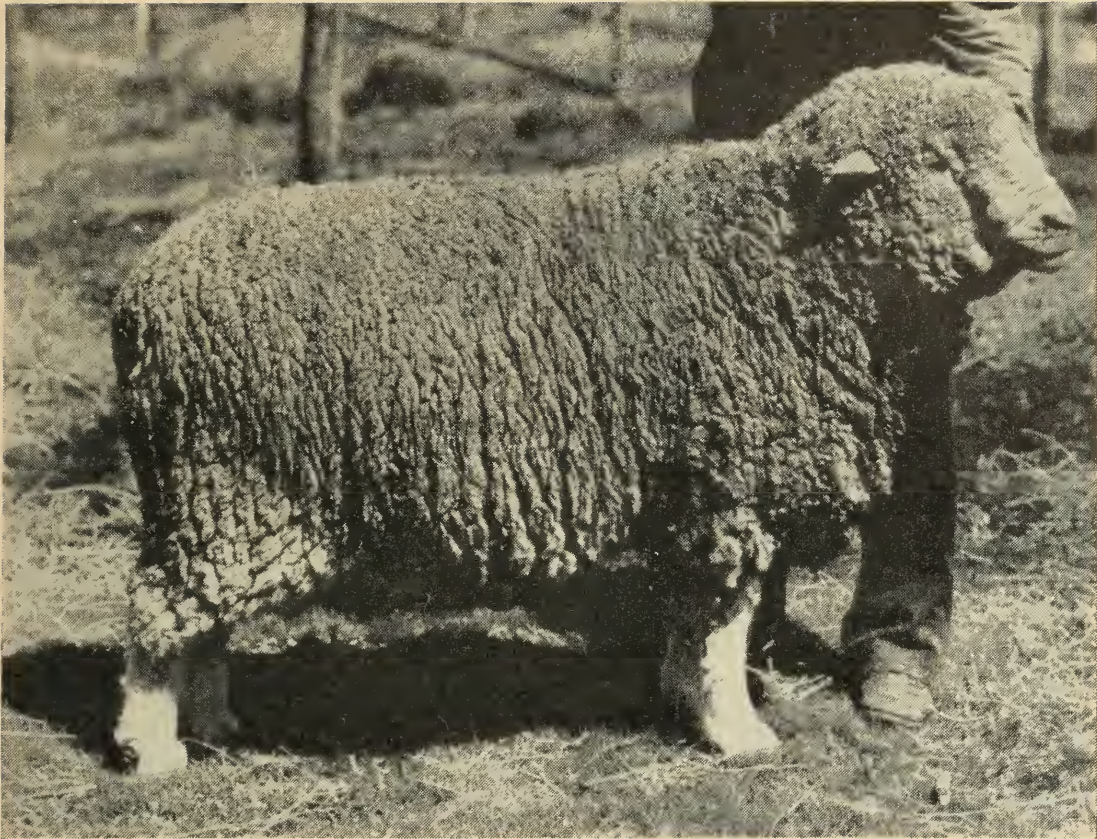
The Romeldale was produced from the same breeds as the Romnelet, the original crosses being made in 1915 by A. T. Spencer, Gerber, California. This breed is very similar to the Romnelet but has more uniformity in wool and in type. At present these sheep are being tested at the Experimental Station, Swift Current, Sask. It is believed that they may find their best adaptation under semi-range or farm conditions, with the rams being useful for crossing on range ewes.

Columbia, Targhee, and Panama

The Columbia and Targhee breeds were developed by the United States Department of Agriculture at the Sheep Experiment Station, Dubois, Idaho, and the Panama by the late James Laidlaw of Muldoon, Idaho. These breeds were developed primarily to meet the requirements of the range sheepman in the intermountain region of the western States. The Columbia was produced by crossing Lincoln rams on Rambouillet ewes and interbreeding the progeny, while the Panama was developed from the reciprocal cross, that is, Rambouillet rams on Lincoln ewes. The Targhee is very similar in breeding to the Columbia and Panama but contains more Rambouillet blood. All three breeds are large, white-faced, polled, and relatively free from wrinkles. Although there have been a few importations of these breeds they have not been critically tested under Canadian conditions.



Figure 6—The Romeldale, developed in California, is of similar (Romney Marsh × Rambouillet) breeding to that of the Romnelet. This breed is being tested at the Experimental Station, Swift Current, Sask.



Courtesy U.S. Sheep Experiment Station, Dubois, Idaho.

Figure 7—The Targhee, developed by the United States Department of Agriculture, is of similar breeding to the Columbia, but contains more Rambouillet blood. This is one of the more promising breeds of range sheep.



Courtesy U.S. Sheep Experiment Station, Dubois, Idaho.

Figure 8—The Columbia developed by the United States Department of Agriculture to meet the requirements of the range sheepmen of the inter-mountain region of the United States. This is a large sheep not too well adapted to poor range conditions.

Suffolk and Hampshire

The Suffolk and Hampshire are black-faced, Down breeds of excellent mutton conformation. Like other Downs they lack the herding instinct, the ability to travel long distances, and sufficient hardiness for range conditions. Rams of these two breeds have been used by some sheepmen to increase weaning weights of the lambs. However, ewe lambs from these crosses should not be kept for breeding purposes.

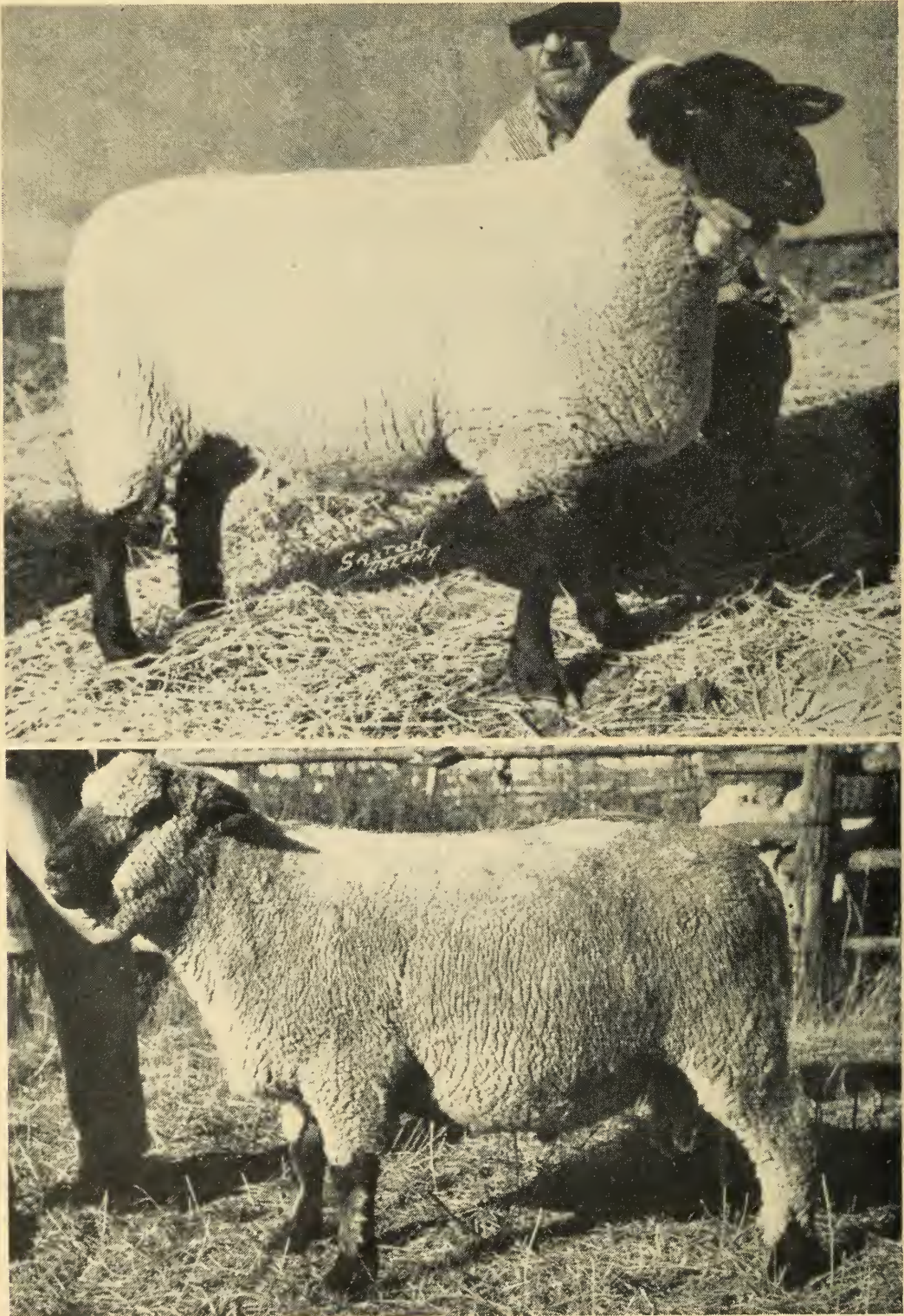


Figure 9—(Upper) A good type of Suffolk ram. (Lower) The Hampshire is an old English breed that, like the Suffolk, is not adapted to range conditions, but is often used on range ewes to improve the type of lambs produced.



Figure 10—Black-faced crossbred lambs produced by using Hampshire or Suffolk rams on range ewes are popular with many feeders.

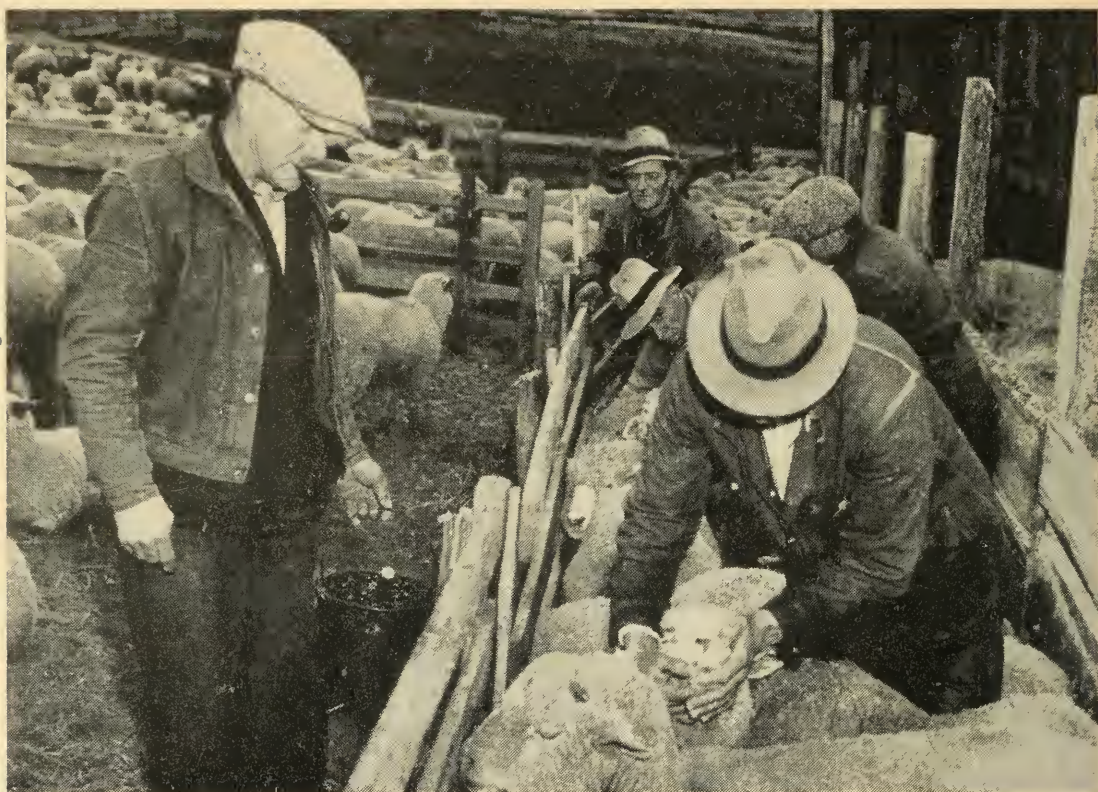
TABLE 2.—AVERAGE BODY WEIGHT, FLEECE WEIGHT, AND GRADE OF WOOL OF THE MORE IMPORTANT BREEDS OF SHEEP USED IN THE RANGE AREAS

Breed	Ewes		Rams	Grade of Wool
	Body weight	Fleece weight	Body weight	
	lb.	lb.	lb.	
Rambouillet.....	140	11·5	250	fine
Canadian Corriedale.....	125	10·5	225	$\frac{1}{2}$ blood
Romnelet.....	125	10·5	225	$\frac{3}{8}$ blood
Romeldale.....	125	10·5	225	$\frac{1}{2}$ blood
Columbia.....	135	11·5	250	$\frac{1}{2}$ to $\frac{1}{4}$ blood
Panama.....	135	11·0	240	$\frac{3}{8}$ blood
Targhee.....	130	11·0	200	$\frac{1}{2}$ blood
Suffolk.....	160	6·0	235	$\frac{3}{8}$ blood
Hampshire.....	175	7·0	250	$\frac{3}{8}$ blood

FALL MANAGEMENT

Selection and Culling of Breeding Stock

Care must be exercised in the selection of breeding stock if maximum returns are to be obtained. Mutton conformation, age, size, soundness of udder and teeth, prolificacy, wool production, smooth body, and open faces are important factors to consider in selecting breeding ewes. It is recommended that the entire breeding flock be examined each fall to cull those whose production is no longer satisfactory. The simplest method of handling the ewes is to use a panel chute approximately 4 feet wide and 50 to 60 feet long, with the operator working in the chute front to rear.



Courtesy National Film Board, Ottawa, Ont.

Figure 11—Ewes or lambs are culled most easily in long, narrow chutes. In culling, all ewes with broken mouths, bad udders, undesirable wool cover or body conformation should be marked for shipment. Ewes that did not have a lamb the previous spring or that weaned a very poor lamb should also be culled from the flock.

The simplest part of the culling program is the elimination of definitely unfit sheep. It is sound practice to cull systematically all ewes in the "oldest age group" each fall. Wool production declines in sheep over five years of age and such sheep do not withstand winter conditions well. Only ewes that are sound in mouth and udder should be retained for breeding. Those with broken or spreading teeth may be in good condition at breeding time but may not survive the winter or be in good condition at lambing time. Ewes with hard udders or hard cores in the udders or teats may be capable of giving birth to lambs but unable to raise them. These animals are of no further value as breeding stock. Care should be taken also not to discount a thin ewe too seriously as she may be a heavy milker and have produced a very good lamb. Ewes that are fat in the fall most likely were poor milkers or dry and should be culled.

Selection of Replacement Ewe Lambs

To maintain the size and the desired average age of the flock, the range operator must replace the cull ewes and losses each year with young ewes. The ewe lambs for replacement should be selected before any lambs are shipped. The lambs can be handled in a panel chute similar to that used for mature ewes. Undersized lambs, those lacking in mutton conformation, and lambs with poor wool covering and excessive face cover, as well as those heavily wrinkled and off-type should be marked for shipping.

Weaning and Marketing

Under normal range conditions lambs are weaned in mid-October. However, the exact time of weaning depends upon market demands, the amount of grass or other feed available, and the time that the ewes are to be bred. Since the

rate of gain made by the lambs decreases as the grass matures and the weather becomes less favourable for grazing, the lambs should be weaned and sold as early in the fall as possible provided the market is strong. Lambs should be weaned at least four weeks before the breeding season so that the ewes may recover some of their body weight lost during lactation. Weaning should take place immediately before marketing unless there is plenty of good quality feed available for the lambs, as shrinkage may be heavy if too much time elapses between weaning and marketing.

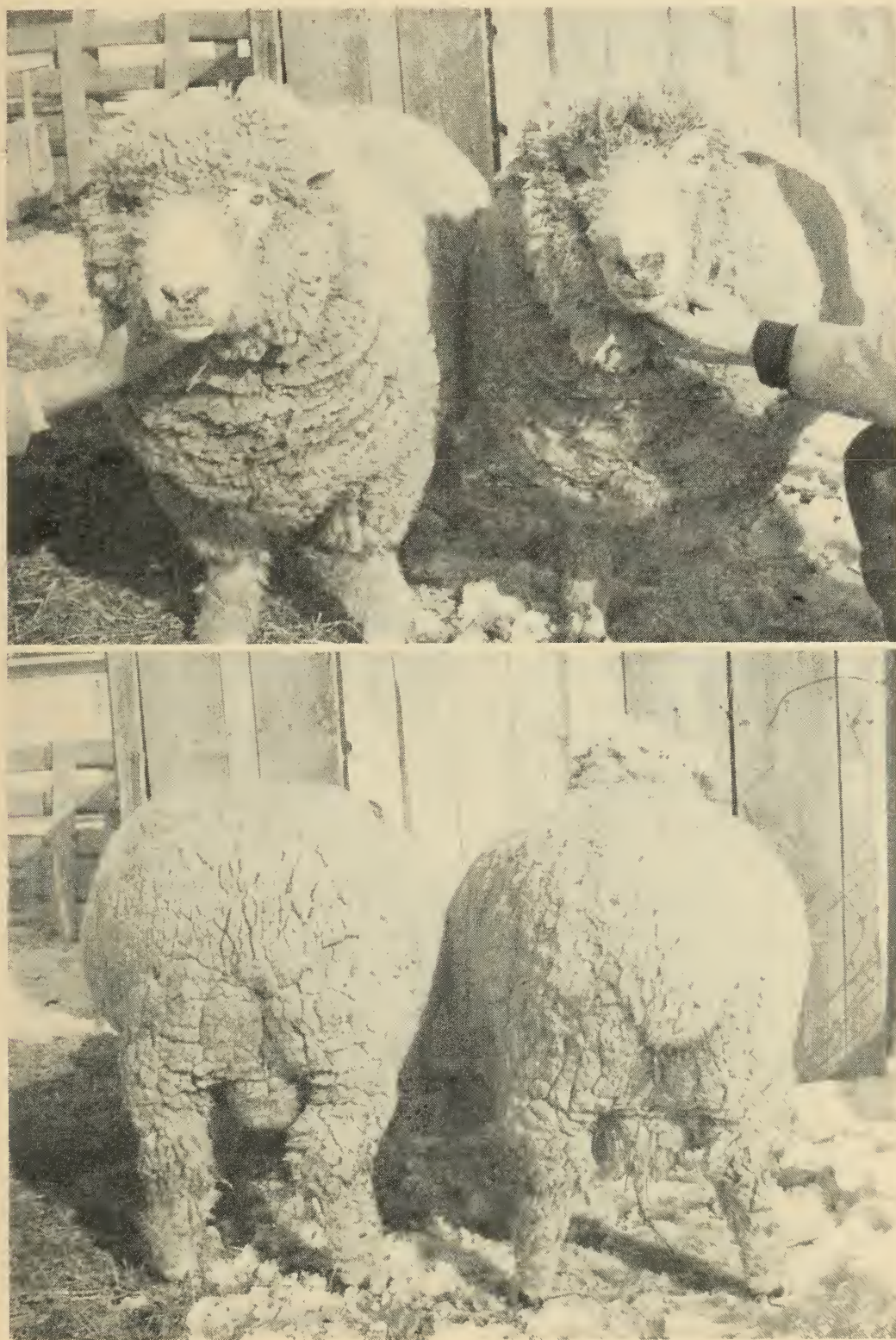


Figure 12—Rams for use on the range should possess good mutton qualities, a good covering of wool, an open face, and hardiness.



Figure 13—In selecting replacement ewe lambs only those of large size with a good wool covering should be retained.



Figure 14—Permanent cutting and sorting chutes and holding pens are essential for handling large numbers of sheep. They are especially useful at weaning, marketing, and shearing. The enlarged portion of the chute may be used for culling and for spraying.

The majority of range lambs do not carry sufficient finish for immediate slaughter and must be sold as feeders. These lambs may be sold directly to farmers or others who make a business of feeding, to feeder associations, to livestock commission agencies, to dealers, or through livestock auctions. The latter method has become very popular for the sale of cattle and would seem to have much to recommend it, but any of the methods mentioned should prove successful if the sheepman deals only with reputable agents.

Many of the cull ewes are still suitable for breeding purposes, if feed supplies are plentiful, and easily could raise two more lamb crops. Consequently, it may be more profitable to sell them to farm flock operators than to packing plants.

Care of the Ewes Before and During the Breeding Season

As soon as the lambs have been weaned and the ewe flock culled an effort should be made to bring all ewes to a good, thrifty condition before the breeding season starts. Under average range conditions many ewes are thin because of scant pastures and a more or less strenuous suckling period and such ewes need special care before the breeding season. Since they are the ones that most likely raised a large lamb or even twins the previous summer they are the ewes that the sheepman wants to raise his lambs the following year.

The term "flushing" has been given to a feeding practice that aims at having the ewes gaining in weight just prior to and during the breeding season. Advocates of this practice claim that a larger lamb crop will be dropped as a result of flushing and that the lambing period will be shorter. These claims have been justified by experiment and practical experience when the ewes were thin before flushing, but not when the ewes were in a good, thrifty condition before being flushed. It would seem to be a better plan to bring the ewes into a thrifty condition as soon after weaning as possible rather than just before the breeding season.

One of the best and most economical means of getting ewes into good breeding condition is to reserve a special area on the range where the ewes can be grazed after weaning. If grass is plentiful, no additional feeds other than salt and a mineral mixture are needed, but if grass is scarce a daily allowance of about one-half pound of grain should be fed. Stubble fields, sugar beet fields, or hay meadows, if available, will provide good grazing for the ewe band.

Whether the ewes graze out during the breeding season or are fed in feedlots will depend upon the weather conditions and the supply of feed. Where grass or other feed is available grazing provides the most desirable method of handling the breeding ewes. However, they should be kept in the vicinity of the main corrals so that an effective system of ram rotation can be practised. If the ewes are in a good, thrifty condition prior to the breeding season no special care is needed. If grass is scarce the ewes should receive extra feed, either in the form of good hay or a small allowance of grain.

Care of Rams Before and During the Breeding Season

It is very important to have the rams in good condition before the breeding season starts. For two to four weeks before the breeding season they should be fed about one pound of grain per head daily. However, no effort should be made to have the rams fat as they may become lazy and poor breeders. Prior to the breeding season, the feet of the rams should be trimmed and any excess wool on the belly, especially around the sheath, should be clipped.

During the breeding season the rams should receive special care. The important factors are that the rams receive rest and additional feed for most effective breeding. Many sheepmen follow the practice of penning all the rams each night and providing them with extra feed. Other sheepmen turn out one-half of the rams on alternate days and keep the other half in for rest and feed. Still others rotate every second day or every week. All these systems have proved satisfactory.

The practice of turning all the rams out with the flock and leaving them there until the breeding season is over has little to recommend it, unless the rams are in very good condition at the beginning of the breeding season and there is at least one ram for every 25 ewes. Where a rotational system is followed three rams are sufficient for 100 ewes. If the ewes are confined in a small area one ram is usually sufficient to breed 40 to 50 ewes. If ram lambs are used at least four are required for every 100 ewes.

Usually rams are left with the ewes for about six weeks. This is sufficient time to permit all ewes a second breeding if they do not conceive during the first heat period. Some ranchers leave the rams with the ewes throughout the winter but this practice is not recommended as the rams will continue to breed those ewes not yet in lamb. This results in a long lambing season with many late lambs. Also, if the rams are left with the ewes, the ewe lambs kept for replacements cannot be run with the main band.

A careful check should be made of all rams during the first few days of the breeding season to see that they are working. Occasionally, a ram refuses to breed and should be replaced by another ram. Some sheepmen paint the brisket of all rams with red ochre at the beginning of the breeding season to detect ewes that do not come in 'heat'. At the end of three weeks, the briskets of the rams are painted with lamp black. If a number of ewes are marked by black from the rams it indicates these ewes did not conceive at first service. If this occurs new rams should be obtained.

WINTER MANAGEMENT

Care and Feeding of Pregnant Ewes

The care and feed that pregnant ewes receive should depend largely upon the climatic conditions that prevail in each sheepman's district, the availability of feed on the range or in nearby fields, and the stage of pregnancy. Since feeding sheep in feed yards is costly and involves much labour every effort should be made to graze the sheep out as much as possible. However, in many areas, largely because of deep snow, grazing is not practical during most of the winter.

The winter range should be in an area where natural shelter is available, and as near as possible to winter feed supplies so that feed can be hauled to the sheep when necessary or the sheep driven to the feeding area. If hay is fed only occasionally the most convenient method is to feed on the ground. The hay should be put out on different ground every day so that the manure voided will be spread over as much range as possible. If hay is fed in feed yards, racks should be used. When feed is being put out the sheep should be kept penned to prevent hay or chaff from contaminating the wool. If grain or concentrates are fed these should be placed in troughs or fed in a pelleted form.

Where sheep are kept on the open range during the winter, emergency winter feed stations should be established at various locations to which the herder can move his flock if a storm is approaching. These winter feed stations should consist of a corral providing some protection and a supply of hay or grain. Too often severe storms come up unexpectedly and catch the flock stranded far from feed and shelter. Death losses during a single storm can exceed the cost of providing feed and shelter.

An adequate supply of feed should be available at the main camp for cold and stormy days. About 12 tons of hay for every 100 ewes is sufficient for a normal winter of about 100 feeding days. If the ewes are fed hay during most of the winter at least one ton of feed for every four ewes should be on hand. The wise rancher will keep at least two years' supply of feed on hand to guard against a severe winter or a very dry year. Grass hay (native grass, brome, crested wheat, etc.) is a satisfactory roughage for pregnant ewes until six weeks before lambing



Figure 15—Economical range sheep production depends upon the maximum use of grazing during both summer and winter. However, during stormy or cold weather, or during the breeding season, it is desirable to supply some additional feed. The above method of putting out feed is not satisfactory as it results in much hay, straw, and chaff getting into the fleece.



Figure 16—Additional feed during the last four to six weeks before lambing is required to ensure a good lamb crop. In those areas where feed on the winter range is not plentiful it may be necessary also to feed the ewes in a feed yard. The use of a well-constructed feed rack will reduce greatly feed wastage.

Recent experiments in Canada at Edmonton, Saskatoon, Swift Current, Manyberries, Ottawa, and Lethbridge have shown that the critical nutritional period during pregnancy is the last month to six weeks before lambing. These experiments have shown that low protein feeds can be satisfactorily fed during early pregnancy but that high protein feeds such as good quality alfalfa hay or protein supplements should be fed during the latter stages of pregnancy and during lactation. Ewes on range should receive approximately one-half pound of linseed oilcake or similar supplement daily during this critical period. The feeding of this supplement should be continued until there is a good growth of green grass. Ewes receiving a full feed of alfalfa or clover hay do not require other protein supplements. Ewes that are fed well during these periods will produce stronger lambs that will be heavier at weaning time. Such ewes also will have sufficient milk for raising twin lambs.

All sheep should have access to a mineral supplement during the fall and winter months. This supplement may be provided in the form of equal parts of bonemeal and cobaltized and iodized salt (blue salt) or a commercial mineral supplement. In certain areas there is some evidence that there is a deficiency of copper also and it should be included in the mineral mixture. One-quarter pound of copper sulphate in 100 pounds of salt and bonemeal mixture is the recommended amount.

Wintering Ewe Lambs

Very often ewe lambs kept for replacements are run with the main band except during the breeding season. However, better development will result if the ewe lambs can be kept as a separate group and given additional feed. It does not pay to feed ewe lambs an excessive amount of grain or other feed during their first winter, but they should be fed sufficient to continue to gain in weight.

If there is an abundance of feed available on the range or in the fields little extra feed is needed during good weather. In stormy or very cold weather the lambs may be given shelter, if necessary, and feed. Alfalfa or clover is an excellent hay for ewe lambs. If this is not available and a grass or oat hay is fed, one-half to three-quarters of a pound of oats or one-half pound protein supplement should be fed per head daily. A mineral supplement should be available to the lambs whether they are kept on the winter range or fed in a feed yard. Additional expenses for good care and management of ewe lambs during their first winter will pay dividends in lower death losses and larger lamb crops when the ewes are mature.

Wintering Rams

When the breeding season is over the rams require very little special care unless they are down in condition. A small winter range or pasture with good grass will provide the basic requirements except during periods of deep snow. In the feed yard good quality roughage will meet their requirements. Ram lambs being kept for future breeding purposes should receive one pound of grain daily in addition to good quality hay to encourage maximum development. A mineral supplement similar to that recommended for ewes should be available to them.

Shelter

Sheep do not need expensive shelter but they do need some protection during very cold weather or driving storms. Usually a shed with one side open is all that is needed. Close housing without provision for adequate ventilation is not conducive to good health. Doors or gates on corrals and sheds should be large enough so that pregnant ewes will not be injured in passing through them. High door steps also should be avoided.

Water

Sheep can get along on very little water if they are grazing when there is snow on the ground. However, on dry feed, it is necessary that clean water be available regularly, preferably daily. To encourage greater consumption, the water in feedlots should have the chill removed.

SPRING MANAGEMENT

Preparations for Lambing

Lambing is the largest operation confronting the sheepman during the year, and from the standpoint of labour, is very expensive. It is also one of the most important operations on the ranch, and the one that will determine the sheepman's success or failure.

All ewes should be tagged or crutched approximately one month before lambing. This involves the removal of the wool on the udder, on the belly area immediately in front of the udder, and between the hind legs up to the tail. (The pregnant ewe must be handled carefully during crutching as rough handling may cause an abortion or difficult lambing.) These tags usually are dirty and interfere with normal suckling by the lamb, or young lambs will often suck them and this increases the danger of infecting the lamb. Crutching reduces losses through lambs chewing and swallowing wool. It also decreases the number of dirty tags at shearing time and the wool clip is increased in attractiveness and value.

Unless it has been done previously, the wool should be trimmed around the eyes of wool-blind ewes at this time. Ewes that can see well are easier to handle at lambing time and will look after their lambs on the range more efficiently.

Finally, the lambing shed should be clean, a sufficient number of "claiming pens" should be available to handle the ewes as they lamb, and an experienced and conscientious lambing crew available. If a large percentage of the lambs born are to be raised, sufficient help must be available to properly look after the ewes both night and day. At least four men will be needed to care for 1,000 ewes during the lambing season. One man should be on duty at night. A sufficient supply of feed should be available for stormy or cold days when the ewes and young lambs must be kept inside.

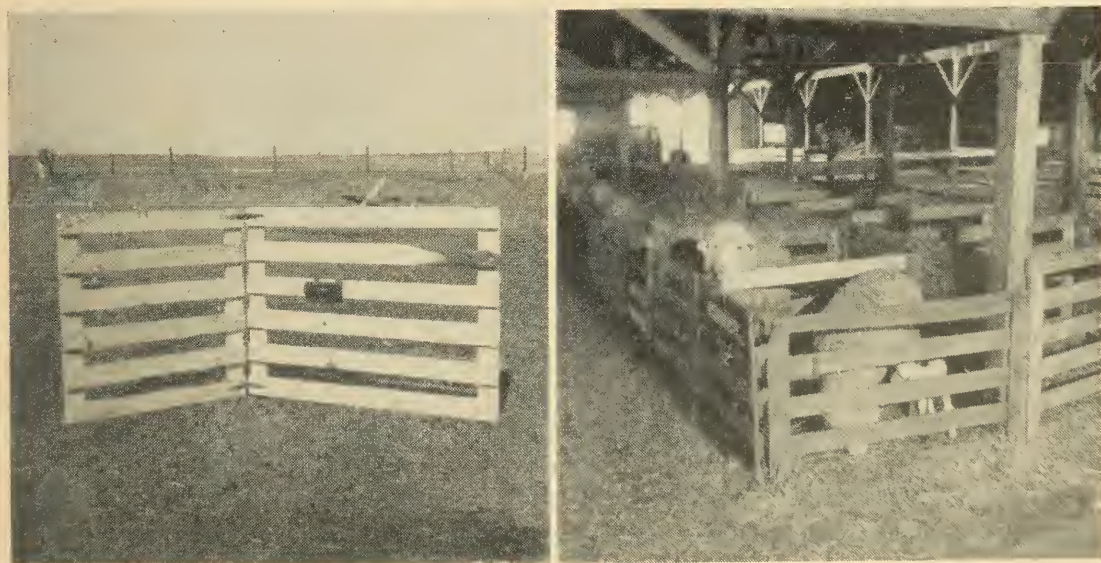


Figure 17—A series of hinged panels as shown on the left make up into "claiming" pens as shown on the right. The ewe and her new-born lamb should be put in a claiming pen and left there until the lamb has suckled and the ewe accepted her lamb.

Equipment for Lambing

A lambing shed is essential for best results, if lambing takes place before green grass is available. The shed may be of any type of construction, lumber, galvanized iron, aluminum, straw, or canvas. The size and interior arrangement will vary with the individual outfit but the general principles are the same. About 10 claiming pens are required for every 100 ewes. These pens ordinarily are $3\frac{1}{2}$ feet square, made from hinged panels (see Fig. 17) and are arranged in rows down the sides and through the centre of the shed for easy access. In addition, disinfectants, castrating and docking tools, branding fluids, and branding numbers should be available for lambing.

Care of the Ewes and Lambs at Lambing

If the ewes have been well cared for during pregnancy and all preparations made for lambing, the care of the ewes and lambs during the lambing period is much simplified. Usually the lambs are born without help, but occasionally, due to abnormal presentation or a very large lamb, some assistance must be given. If a ewe labours for more than an hour she should be examined to determine whether the lamb is in an abnormal position or too large for easy presentation. Before the shepherd assists a ewe his hands and arms should be washed thoroughly. If the right arm is to be used for entering the ewe she should be laid on her right side. Upon entering the ewe with the hand, first determine whether the lamb is in the normal position, that is, front legs first with the head lying between them or a rear presentation with the hind legs coming first. If the position is normal all that is necessary is to pull gently on the legs when the ewe strains. The direction of pull should be out and towards the hocks. If the lamb is in an abnormal position, it should be pushed back into the ewe and an attempt made to turn it to a normal position. Occasionally, two lambs may be coming together and it is necessary to push one back. Under normal conditions, if one uses patience, handles the ewe gently, and observes the general rules of cleanliness most lambs and ewes can be saved.



Figure 18—Lambing wagons such as that above are used to haul ewes and new-born lambs from the range to the lambing shed. In recent years trucks have replaced many of the lambing wagons.

After the lamb is born, it should be examined to see that the membrane over the nose is removed so that it can breathe. If lambbed in a shed a disinfectant such as tincture of iodine should be put on its navel. When the weather is cold it is a good practice to dry the lamb with straw or a sack, if the ewe fails to lick the lamb dry.

Weak lambs should be assisted in nursing. The udders of all ewes should be examined to see that the teats are not plugged and that they have a supply of milk. If the ewe has not been crutched or tagged previously all wool and dirt tags should be clipped from the udder.

Where ewes are lambbed out on the range the ewe and her lamb usually are picked up as soon after lambing as possible and brought to the main lambing camp where they are placed in claiming pens. The ewe is left here with her lamb until it has suckled and until she has become acquainted with it. Ewes that are not penned often attempt to follow the band. This forces the lamb to travel before it is strong enough and may increase losses. A few sheepmen who lamb on the open range have used small, canvas tents quite successfully. These are set up over the new-born lamb and its mother and left there for several hours.



Figure 19—For easy identification the lambs belonging to each ewe should be marked with the same brand soon after birth.

Some sheepmen do not pen the ewes as they lamb but bunch them into small groups. This is satisfactory when the weather is warm and sunny but many lambs will be lost if the weather is cold. A dry shed is essential for such weather. As a general rule, a ewe and her new-born lamb should not be handled more than is necessary as some ewes will then refuse to own their lambs. The ewe and her lamb should be branded with the same identification mark immediately after birth. This enables the mother of any lost lamb to be identified easily. (See Fig. 19).

The ewes should be watered but offered no feed while they are in the claiming pen unless they are to be left there for more than one day. The second day after lambing they usually are moved to a larger pen, along with other ewes and lambs that were lambbed on the same day. When the weather is warm and sunny, they may be turned out and herded as a separate small band, close to the lambing camp. Unless there is an abundance of green grass available, the

ewes should be fed good quality legume hay or at least one pound of grain per head daily. If no pasture is available they should be fed legume hay and grain. The ewe should not be fed too much the first two or three days after lambing as more milk may be produced than the lamb can handle, but later liberal feeding is essential for stimulating milk flow. Water should be available to the ewes at all times.

Raising Twins

It is a common practice where sheep are kept on the range to raise only one lamb from each ewe. The smaller lamb of a set of twins is either destroyed or given to another ewe that has recently lost her lamb. Sheepmen who follow this practice claim that it is better to raise one strong lamb than two small or weak lambs. When ewes are in poor condition and feed is not plentiful, this practice is justified, but if the ewes are in good condition and have a plentiful supply of milk it would appear to be poor economy to destroy one lamb of each set of twins. Ewes raising twins will require extra attention and feed and should be grazed and fed as a separate group for at least the first two to three weeks after lambing.

Data collected over a number of years at the Experimental Station, Lethbridge, Alta., have shown that although lambs raised as twins weighed 9.7 pounds less at weaning time than twin lambs raised as singles (60.8 versus 70.5 pounds) the combined weight of the twin lambs raised as twins exceeded that of the twin lambs raised as singles by 51.1 pounds (121.6 versus 70.5 pounds). This additional weight of lamb weaned by raising twins would well repay any additional costs of feed or care needed during the lambing season. It is evident that the returns from a pair of twins will far exceed that of a single lamb.

Fostering Lambs

Fostering or grafting an orphan lamb or one lamb from a set of twins onto another ewe that has lost her lamb should be done wherever possible. This not only results in more lambs being raised, but also in fewer dry ewes in the band. When a heavy-milking ewe loses her lamb her udder often is damaged permanently unless given another lamb. Also, dry ewes tend to become overfat and as a result are poor breeders the following fall.



Figure 20—After the ewes and lambs are removed from the claiming pens they usually are put into larger pens (left) for a day or so and then turned out into larger groups (right). Note that the ewes are being fed grain in addition to hay or grass.



Figure 21—(Upper) An area with adequate watering facilities close to the lambing camp should be reserved for early spring grazing of ewes with young lambs, and should not be grazed during the remainder of the year. (Lower) A field sown to crested wheat grass provides an abundance of forage two or three weeks earlier than the native range.

In fostering it is important to remember that the ewe recognizes her lamb mainly by her sense of smell. Therefore, it is essential that the smell of the ewe's dead lamb be transferred to the lamb being grafted or fostered. This can be done very satisfactorily by removing the skin of the dead lamb and putting it over the lamb to be grafted as is shown in Fig. 23. This should be left on for two or three days or until the ewe readily accepts the lamb. If a lamb is born dead and there is a surplus lamb, the one to be grafted may be rubbed with the dead lamb or with the after-birth. Sometimes the ewe's milk is smeared on the new lamb to assist in fostering.

The foster mother and the lamb should be placed in a small pen until she accepts it. Care must be taken to see that the ewe is permitting the lamb to suckle and if not the ewe should be held several times a day while the lamb suckles. After the lamb has suckled a few times the ewe usually will accept it. Occasionally, however, a ewe refuses to accept a new lamb, regardless of the methods used in fostering.



Figure 22—If both lambs are strong and the ewe has sufficient milk, it is good economy to raise as many sets of twins as possible.

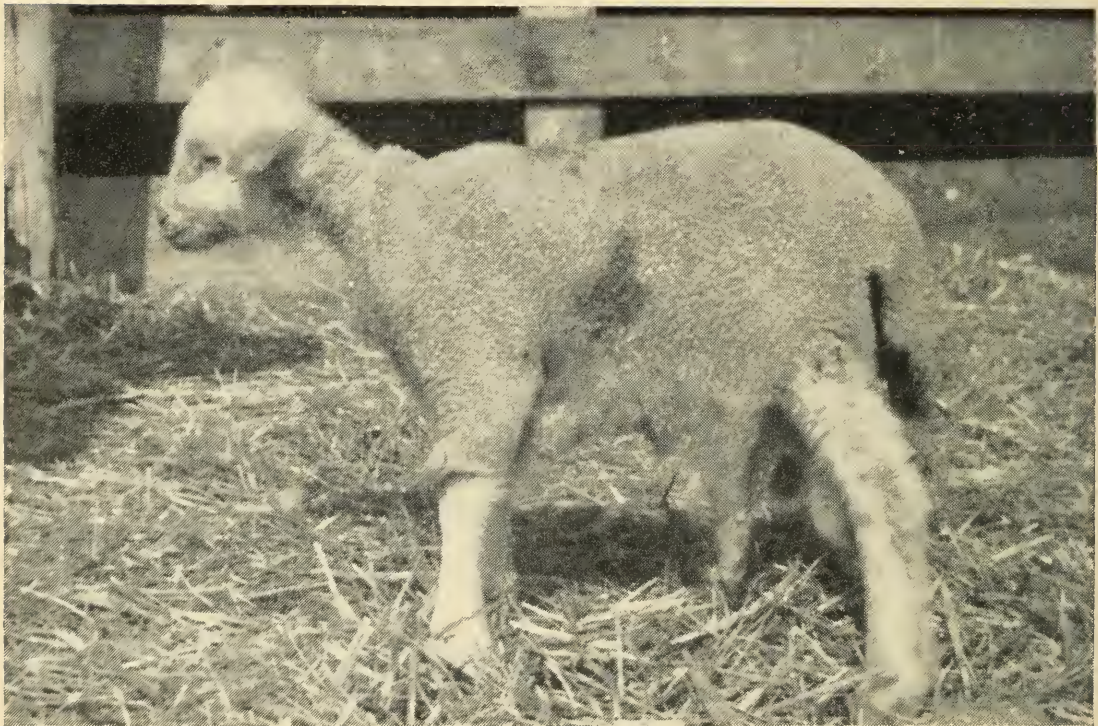


Figure 23—Fostering or grafting orphans onto ewes that have lost their lambs can be done very easily by removing the skin from the dead lamb and putting it on the orphan.

Creep Feeding of Lambs

When lambing occurs early and the lambs and ewes are kept around the feed yards, a creep should be provided where the lambs can be fed grain. A creep is made by using hurdles or panels through which the lamb can pass but which exclude the ewes. (See Fig. 24.) Lambs will not eat much feed in the creep during the first two to four weeks but nibbling at grain in a creep may prevent them from eating dirt or chewing wool. The cost of the feed provided

is usually well repaid in increased weights at weaning time. Creep feeding also is practical on the range where the ewes and lambs are brought back to the lambing camp each night.

Whole oats or oats and a protein-mineral supplement are very suitable feeds for creep feeding. The use of pelleted feeds is advisable if troughs are not used.

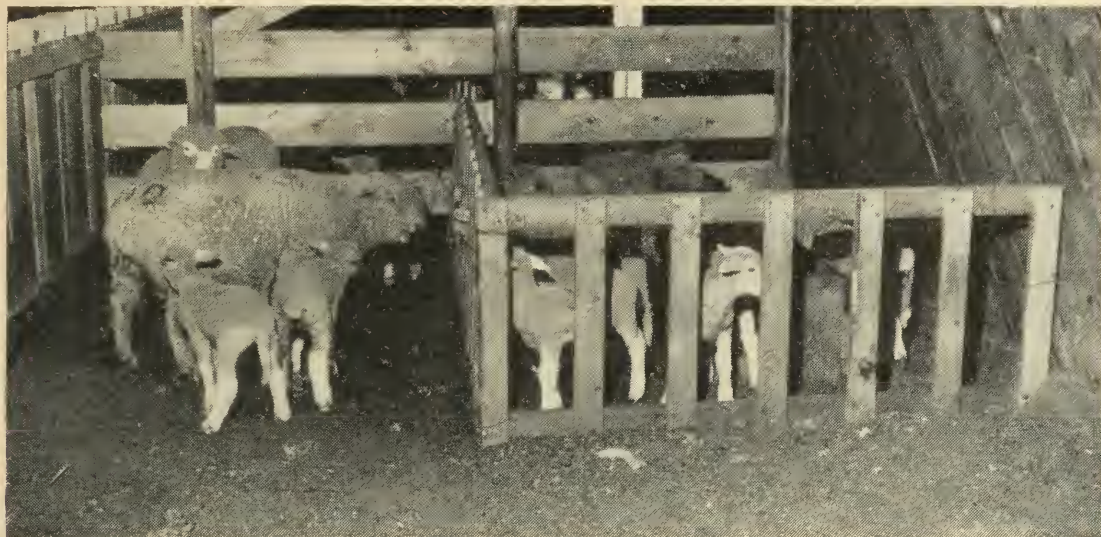


Figure 24—Creep feeding will assist in getting the lambs off to a good start.

Docking and Castrating

The docking of all lambs, and the castrating of all male lambs that are not to be kept for breeding, should be performed when the lambs are one to two weeks of age or younger. No lambs should be left undocked as the tail is a collecting place for manure, burrs, and other filth, and lowers the value of the lamb at the time of sale. The evidence that castrating male lambs results in a faster growing and better fleshed lamb is not so convincing as was once considered. However, since male lambs that are not castrated may start breeding the ewes early in the fall, and since ram lambs do not command so high a price on the market as wethers, all males should be castrated in commercial flocks.

Both docking and castrating are most conveniently done at the same time. A warm, sunny day is best for these operations. Hands and utensils should be thoroughly disinfected and kept clean during the operation.

Docking

Methods of docking vary. Some operators prefer to merely cut the tail off with a sharp knife. This method is quick and relatively painless, but the lamb may lose a considerable amount of blood and the open wound is subject to infection. However, in a young lamb the wound heals quickly. A bloodless method of knife docking developed in Idaho and used extensively in that State is a combination of cutting and twisting. In this method the lamb is held the same as for other methods of docking. The tail is held firmly in the left hand with the thumb just below the flesh on the under side of the tail. This hand is twisted to the left so that the top of the tail is now up. Then, using a knife that is somewhat dull, the tail is cut through to the veins but not through them. To get a square cut on the tail when finished, it is necessary to cut at about a 45 degree angle because the tail is twisted. Then the tail stump is grabbed with the thumb and finger of the right hand and given an upward pull. This breaks the tail at a joint. The tail then is turned to the left with the left hand and pulled. This severs the tail. (See Fig. 25.)

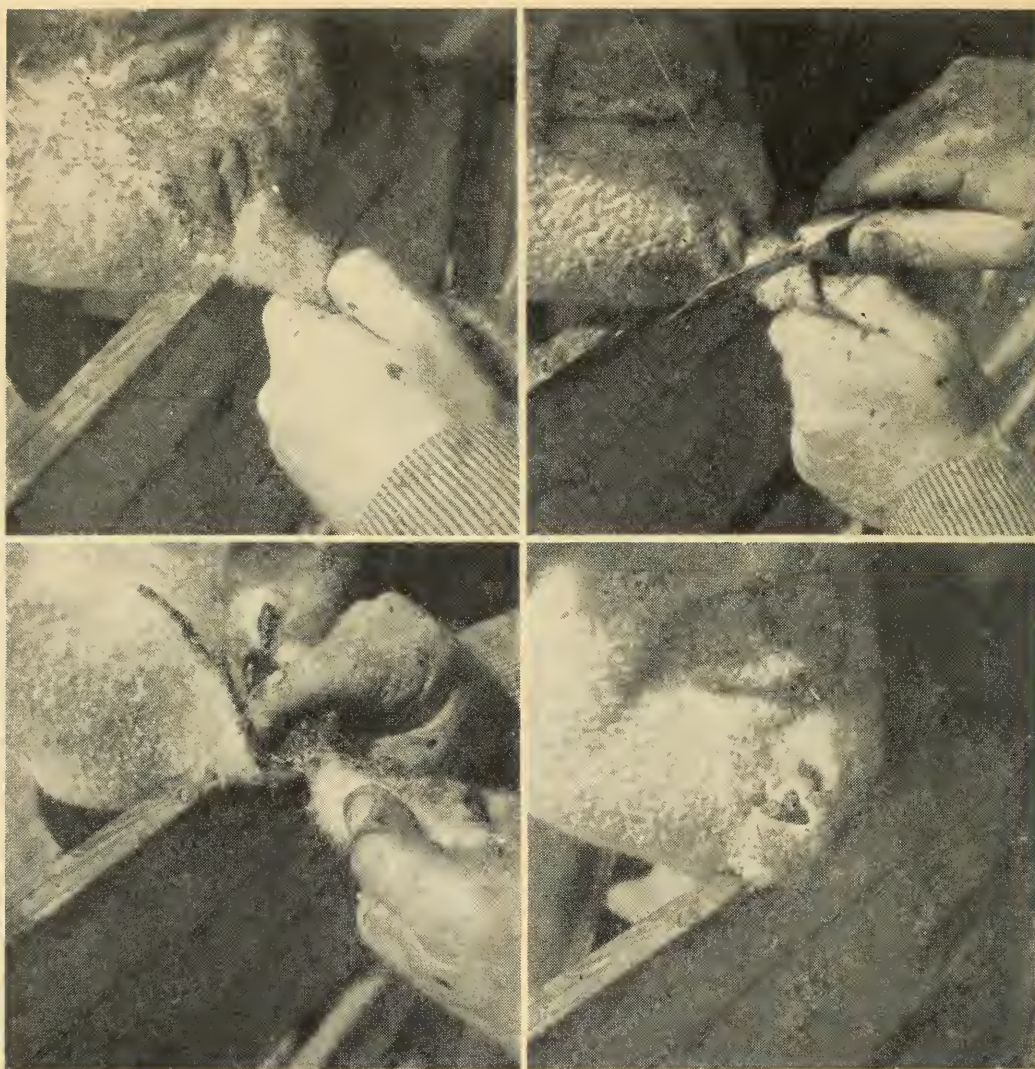


Figure 25—Method of docking lambs using the knife and twisting to sever the tail. (Bloodless method).

Another method of docking is to clamp the tail in a burdizzo or similar instrument and then cut the tail off with a knife. The pressure of the burdizzo crushes the blood vessels and prevents much bleeding. The emasculator, commonly used for castrating larger animals, also is used for docking lambs. This method is quick and relatively bloodless.

Some operators prefer to use a hot iron for docking. This method is bloodless but leaves a scab on the stump which prevents the wound from draining if it becomes infected. In using this method a board should be placed between the hot iron and the lamb to prevent burning the lamb. Comparisons of rate of healing have shown that wounds from heated instruments take longer to heal than those made with cold instruments.

Some prefer to use the Elastrator with which a strong rubber band is placed on the tail to cut off the circulation. The tail usually falls off in a week or so or can be cut off a short distance from the band three or four days after it is applied. When this method of docking is used it is most convenient and satisfactory to place the band on the tail when the lamb is two or three days old. This method appears to cause the lamb more pain than the other methods. It can be done easily by one operator while most other methods require two.

Recently, a tool called the "All-in-one" has come on the market for docking, castrating, and earnotching. The scissor-like portion of this instrument which is used for docking probably is not better than the knife.

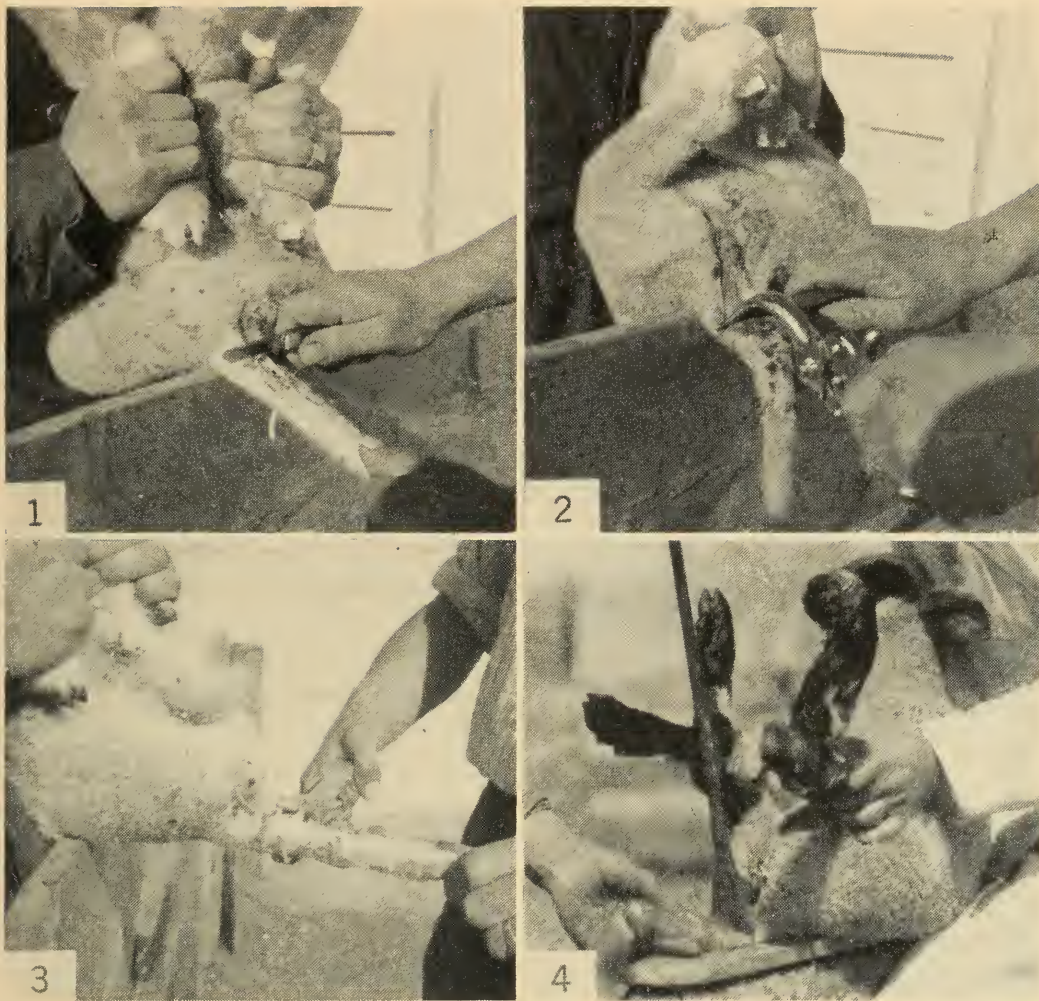


Figure 25A—Methods of docking lambs. 1. Using the knife. 2. Using the Burdizzo and knife. 3. Using the Elastrator. 4. Using the hot iron.

Castration

As with docking, there are a number of methods used by sheepmen for castrating. The most common method is to use the knife, but many prefer the burdizzo, and some the Elastrator or the "All-in-one" tool. In using the knife, the lower third of the scrotum is cut off, the exposed testicles are pushed up with the fingers and thumbs and then pulled out with pinchers, tweezers, teeth, or fingers.

The "All-in-one" tool, mentioned previously under docking, has proved to be very satisfactory for cutting off the bottom of the scrotum and for pulling out the testicles. If the lamb is over three weeks of age, the cords and membrane should be scraped through with a knife or an emasculator used. An antiseptic should be applied to the wound.

When a burdizzo is used the testicles are left in the scrotum but the cords are damaged by the pressure applied above the testicles. There is no loss of blood by this method and no chance of infection. The only disadvantage is that occasionally the cords may not be completely crushed and the testicle remains functional.

In the Elastrator method a rubber band is put around the scrotum above the testicles. The pressure of the band cuts off the blood supply to the scrotum and it falls off after a week or so. This method, like the burdizzo or emasculator, is bloodless and there is little chance of infection. Care must be taken to ensure that both testicles are below the ring or castration will not be complete.

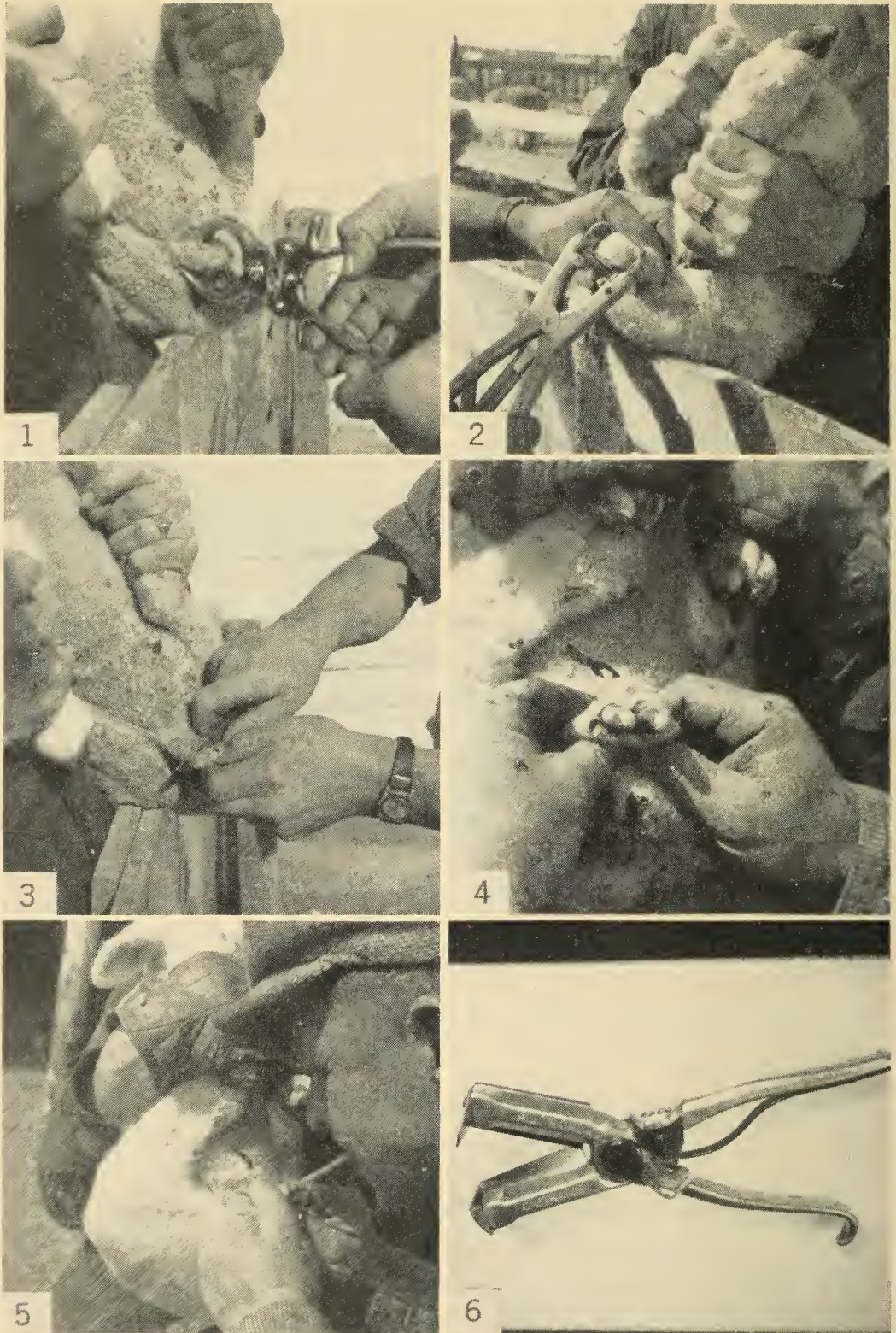


Figure 26—Methods of castration. 1. Using Burdizzo to crush the cords. 2. Applying the rubber band with the Elastrator. 3. Using the knife to cut off the bottom third of scrotum. 4 and 5. The exposed testicles can be removed by pulling with teeth or tweezers. 6. The "All-in-one" tool used for both docking and castrating.

Earnotching for Age and Sex

All wether lambs should be so ear-marked that they can be identified readily. This facilitates cutting and sorting the ewe lambs from the wethers at weaning and marketing time. Cutting an end off one ear is probably the simplest method of identification. This is done most easily when the lambs are being docked and castrated.

The ewe lambs should be ear-notched at a different location on the ear each year so that the owner will know their ages in the future. For example, one year all ewe lambs may be notched on the top of the right ear, the following year on the end of the right ear, and the next year on the bottom of the right ear. The following three years similar notches on the left ear may be used. If it is the plan to keep ewes past six years, a combination of ear-notching on left and right ears may be used. A permanent record should be made of the ear-notching system so that there will be no guess-work in determining the age of the ewes at a later date.

SUMMER MANAGEMENT

Feeding

After lambing has been completed, and provided there is an abundance of green grass or other forage, no supplements other than common salt are needed by sheep. In areas deficient in cobalt, cobaltized salt should be fed. Green grass is an ideal feed for the lactating ewe and her lamb. However, as the range grasses mature the amount of protein, phosphorus, and carotene (vitamin A) in the grass decreases rapidly. Phosphorus supplements such as bonemeal or commercial mineral mixes, should be provided for the sheep as soon as the grass starts to mature. These supplements are supplied most easily by mixing them with salt. All troughs in which salt or minerals are fed should be protected against wind and rain. It is not economical to provide protein concentrates to sheep during the summer or early fall months unless the weather has been very dry and the forage is scarce. Since the animal body can store large quantities of vitamin A, little or no consideration need be given to this vitamin during the summer and fall months.



Figure 27—Good summer range must have an adequate supply of clean water for maximum production and for efficient utilization of the range.

Management on the Range

Since economical sheep production depends upon the maximum use of the range forage, every effort should be made to herd or manage the sheep in such a way that overgrazing of certain areas and undergrazing of others will not result. Overgrazing, besides reducing the amount of forage available for the sheep, permits less desirable species of grasses and weeds to become dominant on the range. The chief causes of overgrazing certain areas are: leaving the camp site in one location too long, insufficient watering facilities to utilize fully all areas of the range, carrying too many sheep for the amount of range land available, and herders who handle their sheep in such a way that all the range is not grazed uniformly.

Camp Site

The camp site should be located preferably on high ground some distance from a watering area. The sheep should be grazed towards the watering area during the morning and left near it during the heat of the day. Then they may be moved back over new ground to the camp site during the afternoon. The camp can be moved to a number of new locations and still use the same watering facilities. The camp should be moved at least once each week to avoid overgrazing and to prevent the grass from being trampled out near it.

Watering Facilities

Ample stock watering facilities should be available at all times. Sheep that are required to trail long distances to water will not make good gains. Because sheep have the habit of all coming to water at the same time, watering facilities, whether they be troughs, dugouts, etc., should have more linear feet of watering space than that provided for cattle. To avoid needless travelling, watering facilities should not be more than two or three miles apart.

Spear Grass and Burrs

Areas that are infested with spear grass should be avoided during July and August when the seed is ripe. The spear grass seed works its way under the skin and causes much discomfort to the sheep, resulting in lowered gains. Normally, lambs that are heavily infested with spear grass do not gain well in the feedlot and also a considerable amount of trimming must be done by packing plants to remove the spears from the carcass. Many feeders refuse to feed lambs that are infested with spear grass. Areas that have many burrs or other seeds that stick to the wool should be avoided during those times of the year when the seeds are ripe.

Carrying Capacity

On the short grass range areas of Western Canada the rate of grazing should be not more than one mature sheep to each 8 to 10 acres. In areas closer to the foothills or other areas of higher rainfall than is common on the short grass plains less land per animal will be required. Generally five ewes with lambs will require the same area for grazing as one cow and calf. Sufficient grass should be left for reseeding. Overgrazing, as mentioned previously, permits undesirable grasses and weeds to invade the range.

Herding

The success or failure of the range sheep industry depends largely on the herder. A conscientious herder will see to it that the sheep make the most efficient use of the range available. Also, he will ensure that his sheep are not molested by predatory animals and that they receive adequate water and salt.

Too often the herder pens the sheep each night, so that they cannot move off to graze before he is up; and when they are out grazing he keeps them in a compact group. The conscientious herder on the other hand will move his camp often, he will not pen his sheep at night, and will be up as soon as his sheep begin to move in the morning. A good herder will herd from the front and sides of his flock rather than from behind and will use his dogs sparingly. He also will let his sheep spread out when grazing, only turning back the odd sheep as it strays too far from the main group, and he will move his sheep to different parts of the range each day so that all forage is grazed evenly. (See Fig. 28). Most herders prefer to work on foot, but if the flock is large and the land rough, herding on horseback has much to commend it.



Figure 28—For best use of the range and for maximum production, sheep should not be herded in a compact group but allowed to spread out over a fairly wide area while grazing.

Good herding practices and adequate watering facilities will result in increased carrying capacity of the range, in the production of heavier lambs in the fall, and a heavier wool clip. However, if the sheep owner expects his herder to do a conscientious job, he must provide him with a comfortable camp and good food.

In areas where predatory animals are not a problem, it is often more economical to run the sheep under fence than to employ a herder. If this system of sheep management is followed, the range should be divided into a number of fields. The sheep should be rotated from field to field as grass cover warrants. This is necessary for, if sheep are allowed to graze a large area without restriction, they will tend to overgraze certain areas and leave other areas untouched.

Spraying or Dipping

Since the sheep ked (commonly called sheep tick) is found on sheep in almost every flock in Western Canada, all sheep should be dipped or sprayed at least once each year. Although it is difficult to assess fully the financial loss among heavily infested sheep, it is generally recognized that such sheep are less thrifty than those that are free of keds. Young lambs that become heavily infested suffer a setback. The fleece of infested sheep also may be damaged through rubbing and biting.

Until recent years dipping was the common method of ridding sheep of keds and other external parasites. In dipping, the sheep are forced into a specially constructed dipping vat and made to swim to the other end. A typical dipping set-up consists of a large holding pen, a small crowding pen at one end of the dipping vat, the dipping vat, and a draining pen where the sheep are held after coming out of the dip, so that as much of the dip as possible will drain back into the vat. Experiments and practical experience have indicated that a dip with an arsenic base will give best results. The dipping vat may be constructed of wood, metal, or concrete and should be about 4 feet deep, 10 to 12 inches wide at the bottom, 20 to 24 inches wide at the top, and 12 to 16 feet long. The top of the vat should be 8 to 10 inches above the level of the ground. The end of the tank at which the sheep are forced in is usually perpendicular, while the end at which they emerge is sloped and ridged so that the sheep can walk out. For best results ewes and lambs should be dipped separately.

Because dipping is a difficult task, hard on both ewes and lambs, and requires a large amount of labour, a system of spraying sheep for ked control was developed in New Zealand and Australia. This system was based on special equipment that was relatively expensive. With the introduction of high pressure sprayers into Western Canada for warble fly control, a simple system of spraying sheep was developed at Lethbridge using these sprayers. The spraying method has become popular throughout Canada and in many places has supplanted dipping entirely.

When properly done, it has proved to be as effective as dipping and involves considerably less labour. The sheep are crowded into a fairly long, narrow, well-drained chute and the insecticide is sprayed onto the sheep with a power sprayer. Usually only the backs and sides of the sheep are sprayed as sufficient spray will seep through to the underside of the animal.

In dipping or spraying it is essential that the insecticide reach all parts of the animal and that all sheep, including lambs, be treated. If the sheep are heavily infested they should be dipped or sprayed twice, the second treatment being about one month after the first treatment. To ensure good penetration of the fleece by the dip or spray, and to conserve the amount of insecticide used, the sheep should be treated not later than two to three weeks after shearing. Dipping or spraying should be done on a sunny, warm day.

If heavily infested sheep are purchased in the fall or winter when it is not practical to dip or spray they may be dusted, either with a power duster or, if the number is small, by hand.

A number of new materials for spraying have come on the market recently. Following are the recommended amounts: (1) D.D.T. (50 per cent wettable powder), one pound mixed in 10 gallons of water; (2) Chlordane, one quart dissolved in 80 gallons of water; (3) Toxaphene, one quart in 75 gallons of water; and (4) Lindane, $\frac{3}{4}$ pound in 80 gallons of water. Approximately one quart per sheep is sufficient for satisfactory control. Whatever material is used, the directions of the manufacturer should be followed closely in preparing the insecticide.

Further details on the spraying or dipping of sheep for the control of keds or other external parasites and the types of insecticide to use can be obtained by writing to the Livestock Insect Laboratory, Lethbridge, Alta.



Figure 29—A sheep herder, his dog, and his home. Much of the success of the range sheep business depends upon the herder. His needs are not great but every effort should be made to provide him with good food and with as comfortable and convenient quarters as possible.



Figure 30—Spraying sheep for ked control is as effective as dipping. It requires less time and labour and is much easier on the sheep.

Shearing

Time of Shearing

In Western Canada, shearing normally is carried out during May and June, after lambing has been completed. However, exact time of shearing will vary with the availability of shearers and the arrival of warm, dry weather. It is inadvisable to shear until the weather has become relatively warm, unless adequate shelter is available. Removing fleeces before the danger of late spring storms is over involves the risk of heavy death losses on the open range. Shearing before warm weather arrives is also more difficult. A few warm days will cause the yolk to soften and the shears will operate more easily. In cold weather the grease and dirt in the fleece tend to clog the equipment and shearing becomes relatively slow and laborious. However, shearing should be done as early as possible in order that the sheep will have time to grow a sufficient covering of wool to protect them during the following winter.

A common practice in many shearing sheds is to sweat the sheep prior to shearing. The sheep to be shorn are crowded into large holding pens in the shed and, as a result of the heat generated by the sheep, they sweat considerably. This causes the yolk to soften and facilitates the removal of the fleeces.



Figure 31—Poor nutrition, sickness, or sudden changes in feed often will cause sheep to slip their fleeces and reduce the amount of wool for sale.

Shearing Sheds and Equipment

Where large flocks are kept it often is desirable to have a separate, permanent shearing shed. However, any building having a waterproof roof can be used. The lambing shed usually is the most suitable building available for shearing and is one that can be converted readily for this purpose. Provision must be made within the shed for large sweating pens to hold the sheep before shearing; a catch pen for each shearer; a tight, smooth, board shearing floor; and space for sacking and storing wool. Slatted floors are desirable in the holding pens to keep the wool as clean as possible. Through their use the sheep are raised off the ground and have no opportunity of coming in contact with litter or fecal material on the shed floor. Figs. 32 and 33 show a temporary shearing shed arrangement using removable floor sections and board panels.

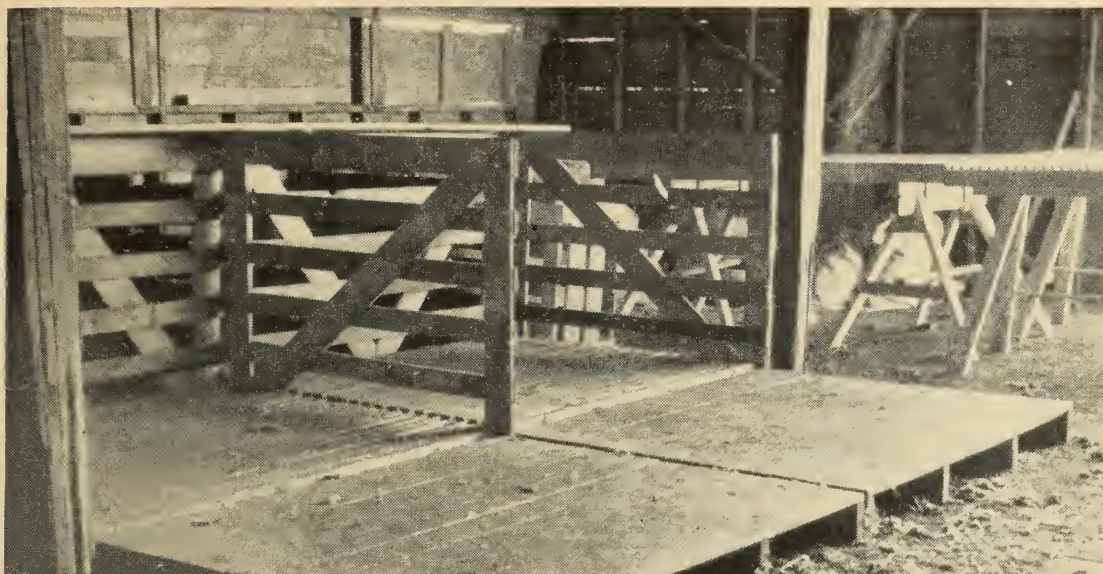


Figure 32—A portable set of holding pens and shearing floors that have been used successfully at the Experimental Station, Lethbridge. Every effort should be made to keep the wool free from manure and dirt before and during shearing.

Essentials of Good Shearing

Shearing is a strenuous task and one that requires considerable skill if it is to be done well and quickly. In the range areas, shearing normally is done by professional or highly experienced workers who do nothing but shear for several weeks each year. Skilled operators are essential since good shearing requires that a sheep be handled carefully and that it be not injured while the wool is being removed. If the shearer is experienced the sheep will not struggle while being shorn. An unskilled operator will have difficulty in preventing the animal from struggling.

In shearing there should be no "second cuts" and the fleece should be removed in one piece so that it can be tied easily. Great care must be exercised in shearing the udders, particularly of yearling ewes, as it is very easy to cut off the end of a teat and permanently spoil that portion of the udder. In the event that a sheep is seriously cut with the shears, the wound should be treated with a disinfectant and if necessary sewn up.

Methods of Shearing

Blade shearing and machine or power shearing are two methods in general use. The former involves the use of blade shears operated manually, whereas the latter makes use of power driven clippers resembling much-enlarged barber clippers.

There is considerable prejudice against power shearing. Many ranchers feel that this method leaves insufficient wool on the skin to prevent sunburn, or, if storms occur, to prevent the sheep from becoming chilled. This can be overcome, at least in part, by using thick combs in the machine, thus leaving more wool on the skin. Power shearing is faster than blade shearing and this is an important consideration during the rush of spring operations. With trained shearers using power clippers the wool is removed with fewer second cuts, and this increases the value of the wool clip. The danger of injury with power shears is no greater; sheep may be cut seriously by either method if the operators are inexperienced or careless.



Courtesy National Film Board, Ottawa, Ont.

Figure 33—Many sheep ranchers now use power equipment for shearing their sheep. When properly used these machines improve the quality of the wool clip.

Preparation of Wool for Market

The main fact to keep in mind in the preparation of wool for market is that the manufacturer, who is really the purchaser, makes use of the wool, only, and not the other material that is present in the fleece. He buys fleece wool on the basis of the clean, white wool that it contains; everything else is waste material that has to be removed. Consequently, it is in the interest of the wool producer to keep such waste material to a minimum by all possible, practical means. Careful preparation of the fleeces will result in higher returns from the wool.

The ideal procedure is as follows. When the fleece has been removed from the sheep it should be spread out skinside down on a slatted table. (See Fig. 34). All manure tags and sweatlocks from the fleece should be removed and packed separately. Damp tags should never be rolled up inside the fleece as they will cause discoloration of any wool with which they come in contact. Face and leg pieces should be separated from the fleece. In the black-faced breeds these areas usually contain black or grey fibers that are particularly objectionable to the manufacturer as they cannot be used in white or pastel coloured goods. Burry, chaffy, or strawy portions of the fleece also should be removed and packed separately.

When the low-grade wool has been removed, the most valuable portion is ready to be tied. One side of the fleece should be folded in one third of the way, then the other side folded in covering the first fold. The fleece should then be rolled tightly from breech to shoulder to expose the best portion for inspection when graded. The rolled fleece should be tied with a paper twine especially made for the purpose, never with binder twine or store string. Paper twine is used because any particles entangled in the wool disintegrate in the scouring process, whereas binder twine may leave fibers that become mixed with the wool and later appear as an imperfection in the finished fabric.

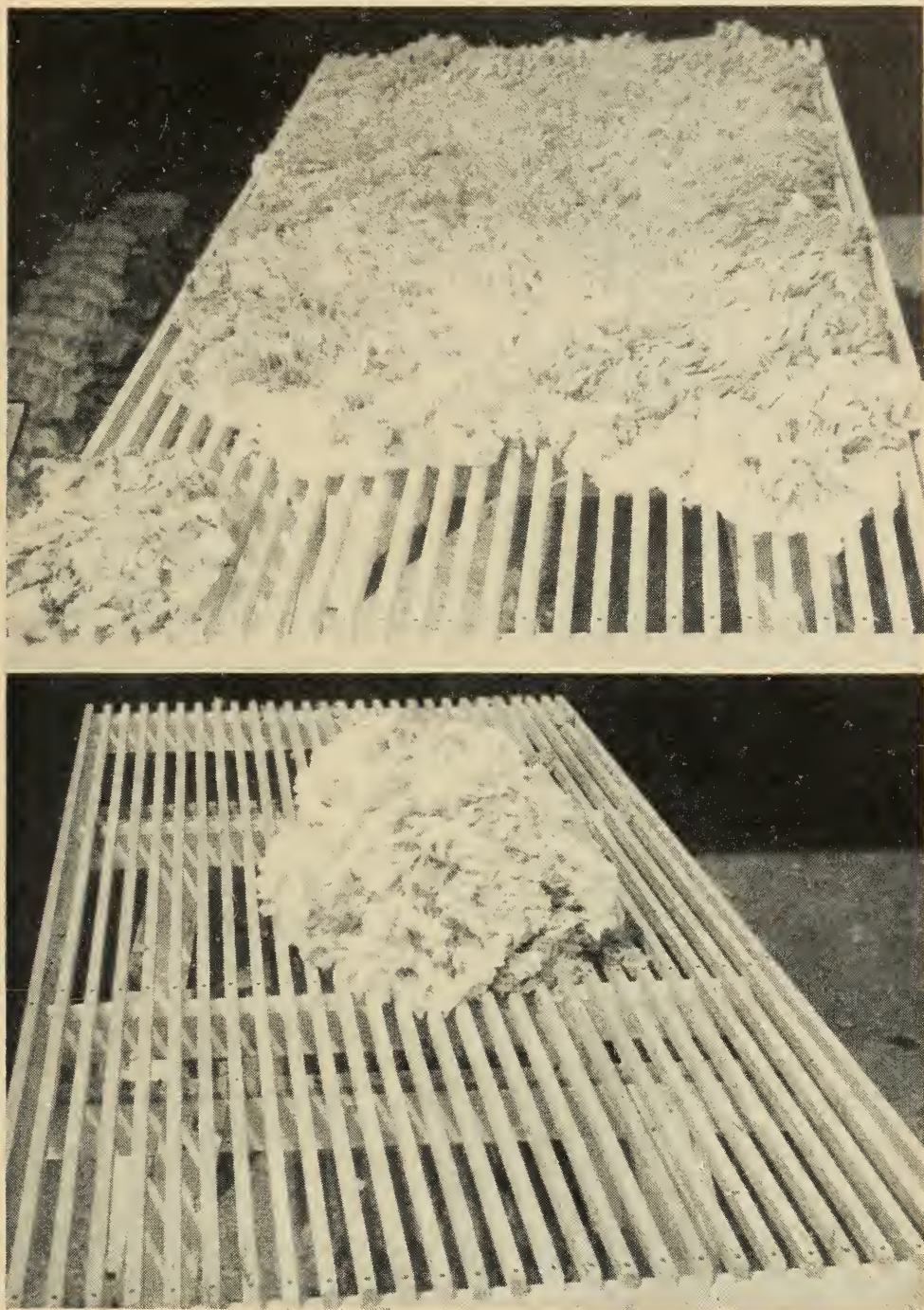


Figure 34—(Upper) Careful preparation of fleeces means improved quality of clips and increased returns. Fleeces should be spread out on a slatted table and the off-grade wool removed before tying. (Lower) The fleece should be rolled so that the more expensive shoulder wool is exposed to the buyer. It should be well tied so that it will stay together in subsequent handling.

Black or brown fleeces should be handled separately, and the tags and skirtings from such fleeces also should be kept separate.

Most producers may feel that this procedure is too complicated, and modifications may be made if these essential points are remembered: (1) wet tags cause damage to surrounding wool in a fleece; (2) strawy, burry, and chaffy fleeces are degraded, whereas if the affected parts are removed by the producer only these parts are degraded; (3) a well-rolled, well-tied fleece leaves a good impression on the buyer; (4) binder twine on a fleece is the ultimate sin.

When the fleeces have been prepared they should be packed tightly in large wool bags. Tight packing permits maximum loading of shipping cars, and facilitates handling. One bag will hold approximately thirty fleeces and when filled will weigh between 225 and 350 pounds. Storing the packed wool is an important consideration if it is not to be shipped to market immediately. Wool can be held in storage for relatively long periods if it is kept dry and protected from insects and high temperatures.

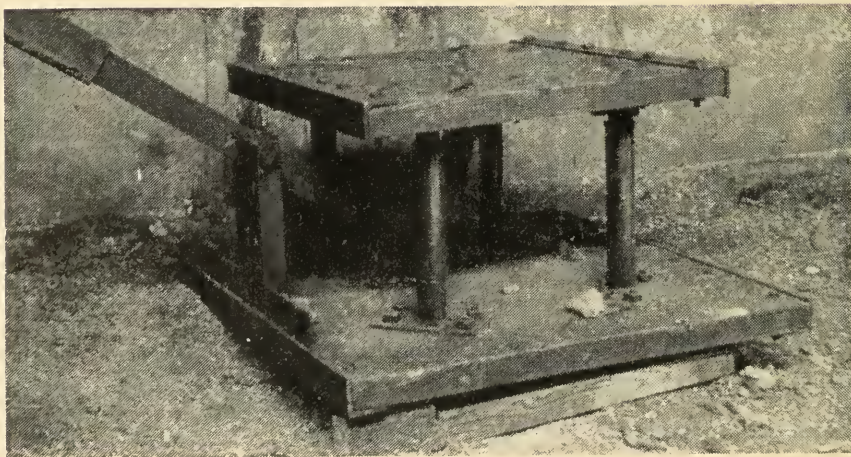
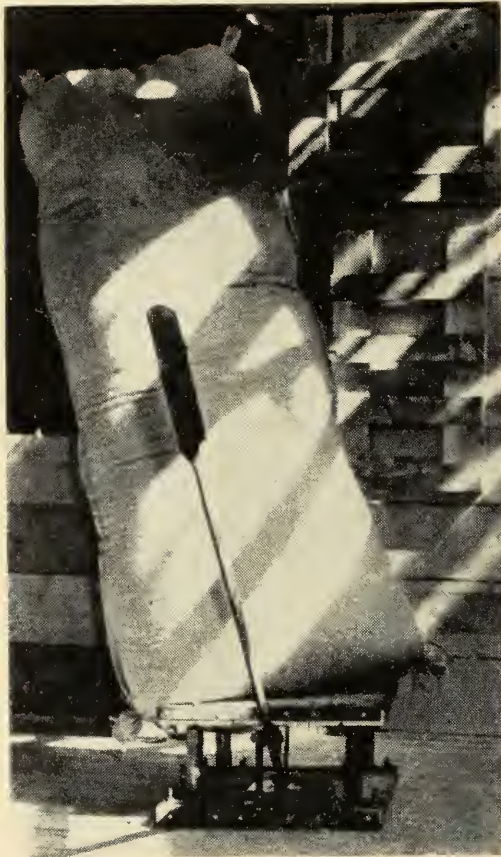


Figure 35—A lift of this type makes it easier to raise the wool sack for sewing.



Figure 36—If wool is not to be shipped immediately, it should be stored in a dry, cool shed.

Branding

As soon as the sheep are shorn they should be moved to holding pens and marked with the owner's brand for identification. It is essential that the sheep be branded with a material that will keep the brand clearly legible for at least one year but, on the other hand, will scour out in the processing of the wool by the manufacturers. Considerable damage to both machinery and materials results from the use of an insoluble paint. These added costs of manufacture reduce the price paid by the manufacturer for wool.

Soluble branding fluids are available at all wool growers' supply houses and only such materials should be used. A minimum number of brands should be placed on the sheep and the paint used as sparingly as possible. Materials such as tar, lead paint, and crank-case oil should never be used.

Some Wool Characteristics and Their Importance in Production

Wool is not only important as a protective covering for the sheep during the winter months, it accounts for approximately one-third of the revenue from the sheep enterprise. Therefore, it deserves consideration in a sound breeding program. Fineness of fibre, length of staple, density of fibres on the skin, and fleece weight are related directly to the amount and value of wool. By observing these characteristics it is relatively easy to select for high wool production.

Fineness of fiber determines not only the grade of wool but also the type of finished fabric and thus the price per pound that will be received by the grower. Usually the finer wools bring a higher price than the coarser types

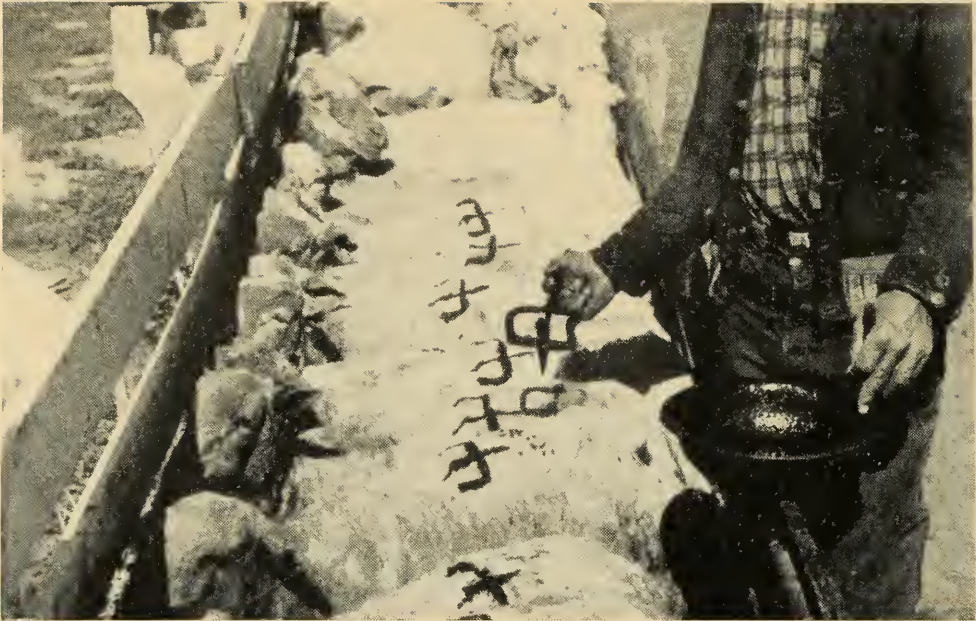


Figure 37—Immediately after shearing, the flock should be marked with the owner's brand for identification purposes. Only recommended branding fluids should be used for this purpose.

although in rare instances this may not be true because of an abnormal demand. From the grower's standpoint it is important that he select a breed of sheep that will produce the type of wool most acceptable to the market and that still will withstand the rigors of winter. In a wool improvement program uniformity of fineness between different body areas (i.e. breech and shoulder) also is very important. Uniformity is indicative of good breeding and in manufacturing it reduces the amount of wool sorting required.

Staple length is another fleece characteristic that is related to economic value since all wool within a particular grade must be of a certain length to obtain the highest price. Staple length also is related directly to the amount of wool grown, that is, sheep with a longer stapled wool will have heavier fleeces. Length of wool is a highly heritable characteristic but can be influenced greatly by level of nutrition. Experiments at the Experimental Station, Lethbridge, have shown that a high plane of nutrition will increase the fiber length up to 50 per cent when compared with that of a low plane of nutrition. Uniformity of fiber length on the different body regions also is essential as it reduces losses in combing processes and ultimately means a greater return to the grower.

Density, or the number of fibers growing on a given skin area, also is very important in a wool improvement program. The larger the number of fibers growing on a particular area of skin the greater will be the amount of wool produced. Large differences exist between sheep in the same flock and with a little experience it is possible to detect the superior sheep. This may be done by grasping the fleece at two or three points along the side and back and judging by the quantity held in the hand which sheep produces the larger amount of wool.

Raw fleece weight is a good index of total wool production since it measures the combined effects of fineness, length, and density. As a result satisfactory improvement can be made by selecting on this basis. The most accurate culling can be done at shearing time by actually weighing the fleeces and marking the low producing ewes for fall shipment. If this is not practical an alternative method is to cull in the fall by handling the ewes through a chute and culling the ewes with short stapled, open fleeces, and those that are off type and of poor quality.

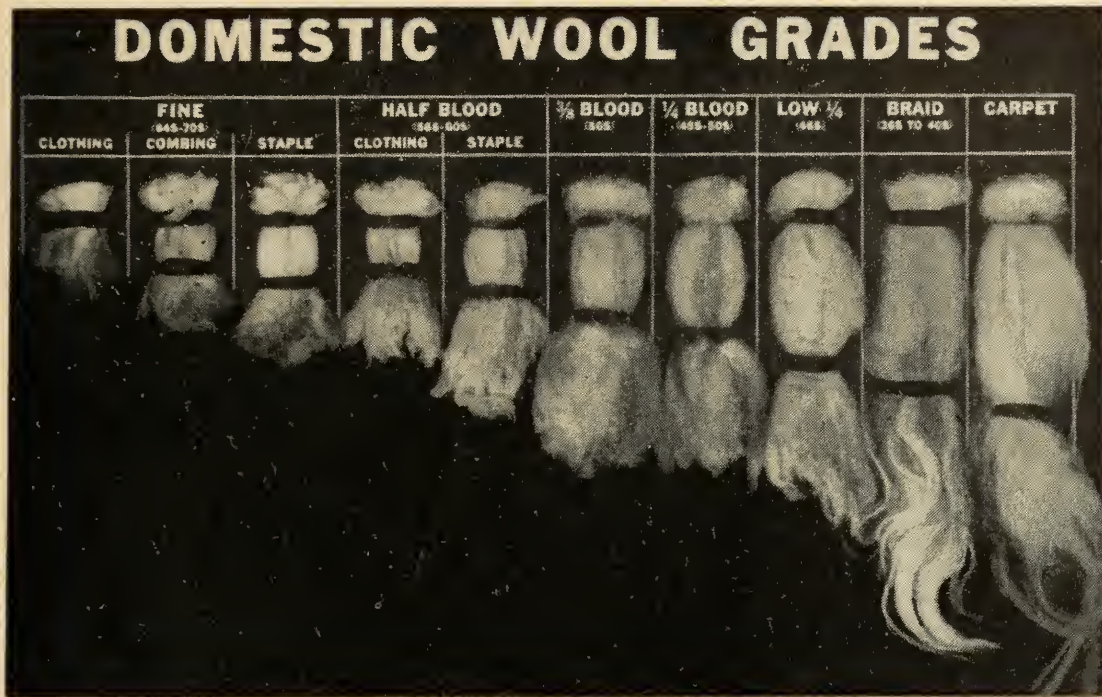


Figure 38—The main wool grades shown above indicate the general relationship of fineness to length. The majority of range wools fall within the fine, $\frac{1}{2}$ blood, and $\frac{3}{8}$ blood classes.

SHEEP LOSSES

Death losses in the sheep flock reduce profits and should be kept as low as possible. Since most of the losses can be traced to some weakness in the general management of the flock, reduction of losses is within the control of the sheep owner. The common causes of death among range sheep are: diseases and parasites, poisonous plants, predatory animals, storms, and lack of proper feed.

Diseases and Parasites

Diseases and parasites can be a cause not only of death but of lowered efficiency. Emphasis should be given to prevention for in a large range flock individual treatment of sick sheep may appear to be impractical. In the past there has been a tendency to consider that "a sick sheep is a dead sheep". New information on prevention and cure has made possible more effective control of diseases and parasites, so that the position of the producer is more favourable in this respect than in the past. The latest available information on these subjects may be obtained from your Experimental Station or from Information Service, Department of Agriculture, Ottawa.

Poisonous Plants

Poisonous plants are the cause of many sheep losses in Western Canada. Fortunately most poisonous plants are not palatable to sheep and, therefore, are not eaten readily unless other forage is scarce or the sheep are very hungry. Also, many plants are poisonous only at certain stages of growth or when grown on some soils or under certain climatic conditions.

To avoid losses the sheepman must be able to recognize the plants that cause losses and govern his management practices accordingly. Camp sites should not be located near areas where poisonous plants are growing. Areas that contain these plants should never be grazed heavily, and should be grazed only

in the afternoon and evening when the sheep are filled and are more selective in their grazing habits, or during that time of the year when these plants are relatively non-poisonous. It should be remembered that if sheep are hungry for salt or other minerals they will graze poisonous plants that they ordinarily would not eat. In some cases it may be economical to eradicate poisonous plants or to fence off infested areas but in most cases reliance must be placed on the proper handling of the sheep and the range.

Medicinal treatment of poisoned sheep usually is ineffective as most poisons act so rapidly that the animal is dead before much can be done for it. If the animal has not had sufficient poison to cause death it usually will return to normal in a short time. In an occasional case consumption of poisonous plants becomes habit forming and if such is the case the flock should be moved to another range that is free from these plants.

The poisonous plants that cause the greatest losses among sheep on Western Canadian ranges are death camass, arrow grass, water hemlock, loco weed, and lupines.

Death Camass

The death camass, is an onion-like plant with yellowish flowers, found chiefly around sloughs, ravines, and on slopes where snow lies deep in winter. It is most dangerous in the very early spring or when the range becomes overgrazed. Animals eating too much of this plant show stiffness of the legs, difficulty in walking, frothing at the mouth and nose, rapid breathing, sudden jerking of the head, and finally collapse. Drenching the sheep with five to eight grains of potassium permanganate and eight grains of aluminum sulphate in a pint of water when the first symptoms of poisoning are seen is claimed by some sheepmen to be a successful remedy.

Arrow Grass

Arrow grass is found in all provinces of Canada and grows chiefly in poorly drained, heavy soil around sloughs. The leaves of arrow grass are narrow, long, dark green, and fleshy. The plant stays green all summer. Arrow grass is high in salt and is especially relished by stock deprived of salt. The symptoms of poisoning are rapid breathing, frequent urination, frothing at the mouth, and convulsions. Because of the rapid course of the poisoning, treatment normally is of little value.

Water Hemlock

Water hemlock, sometimes called wild parsnip, is a tall, erect, marsh plant with a smooth, hollow stem and small greenish white flowers arranged at the top of the branches of the stalk in dense, flat-topped clusters. It is found both in the foothills and on the prairies, always in low, wet, marshy land. Sheep that eat a sufficient amount of this plant to cause poisoning show frothing at the mouth, uneasiness, bloating in some cases, followed by convulsions and death. The poison in water hemlock is one of the most rapid poisons known, and little in the nature of medical treatment can be done.

Loco Weed

Loco weeds are usually three to ten inches in height and grow in bunches. Their flowers resemble those of peas in shape. Loco weeds grow principally on open land in the foothills, on hillsides, and on prairie that is stony, gravelly, or sandy. Loco poisoning develops slowly, the first symptoms noticed are a lack of muscular control when walking and the inability to judge distances and objects accurately. In some cases wool shedding occurs. No satisfactory medicinal treatment is known for loco poisoning in sheep.

Lupines

Lupines, or wild beans, are found only in the foothill and mountain areas. The flowers, somewhat resembling those of a pea, are arranged in elongated spikes. The seed pods are flattened. Lupines make excellent feed until the plants form pods. Usually only the seeds contain sufficient poison to cause death. The symptoms are similar to poisoning from loco weeds, but develop faster. No satisfactory remedy is known for this type of poisoning.

Other Harmful Plants

Plants such as low larkspur, chokecherry, cockle burrs, greasewood, etc., occur on the range but do not cause extensive losses. Halogeton, a poisonous weed that has spread widely in the Western United States during recent years, is very poisonous to sheep. This weed resembles Russian thistle in many respects. Some cultivated plants that are normally non-poisonous may become poisonous under certain conditions. Oat hay or oat straw grown on certain soils have caused severe losses during certain years because of a high nitrate content. Death caused by low clotting power of the blood may result from feeding sweet-clover hay that has moulded. Ergot-infested grasses and grain may result in many losses. Plants with awns or spears such as spear grass, wild barley, and poverty grass are harmful. The spears or awns of these plants become embedded in the mouth, get into the eyes, or pierce the flesh. Although these plants seldom cause death they do cause much discomfort to the animals with the result that gains are reduced.

Predatory Animals

Predatory animals (coyotes, dogs, wolves, bears, etc.) cause considerable annoyance and losses among sheep but aggressive action can minimize them. A watchful herder during the day, and the use of flares or lanterns at night, will do much to lessen the losses. Penning the sheep at night may prevent some losses but is not considered good range practice. The use of bells on a few ewes in each flock may afford some protection.

Co-operative effort on the part of the sheepmen and government agencies to destroy as many of the predatory animals as possible by poisoning, trapping, and shooting, has aided in reducing losses. However, it must be remembered that many predatory animals do some good in keeping down the numbers of rodents and other animals that, although not causing death among sheep, do consume a considerable amount of range forage.

Faulty Nutrition and Management

Faulty nutrition, other than starvation, usually does not in itself cause death but poorly fed sheep are not profitable sheep. Insufficient feed or poor quality feed for pregnant ewes is often the cause of heavy losses among ewes and young lambs. Mineral and protein deficiencies on the fall and winter range often cause unthriftiness and loss of condition. Proper feeding and management is discussed elsewhere in this bulletin.

Other Causes of Death

Severe storms during the winter or spring cause heavy losses among certain flocks. These losses can be guarded against by providing sufficient feed reserves and emergency shelters on the winter range. Storms during lambing or soon after shearing also may result in heavy losses. If adequate shelter is available these losses can be prevented in most cases.

Dirty water also causes death losses. The green algae or "slime" often seen on small sloughs or watering holes is at times poisonous. Where possible only good clean water should be offered to sheep.

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